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October/November 2019

Volume 41, Number 5

Species act rollback 14

In August, Trump administration officials proposed changes to the Endangered Species Act, purportedly with species recovery as the ultimate goal. It did not take long for Earthjustice to file suit.

Coral reef decline 15

Based on three decades of unique data from Looe Key reef in the lower Florida Keys, a new report concluded that the problem of coral bleaching and disease is not due primarily to a warming planet, but to a planet that is being enriched with reactive nitrogen.

Phase 1 standard 16

Significant changes to the Phase 1 environmental site assessment standard are being considered by members of the ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action. Nick Albergo provides an update.

1,4 dioxane standard? 16

Roy Laughlin responds to an inquiry from a reader regarding the possibility of a federal drinking water standard for 1,4 dioxane. (Hint: He thinks there's no chance.)

Military waste cleanup 18

Residents of a small Brevard County community have complained about military waste buried there for close to 20 years. A federal cleanup effort is finally underway.

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Got a story lead?

Got an idea for a story? Like to submit a column for consideration? Let us know. And don't forget to fill us in on your organization's new people and programs, projects and technologies—anything of interest to environmental professionals in Florida. Send to P.O. Box 2175, Goldenrod, FL 32733. Call us at (407) 671-7777; fax us at (321) 972-8937, or email mreast@enviro-net.com.

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Photo courtesy of Vertebrae Well Systems/EN Rx Inc.

Vertebrae Well Systems installation crew simultaneously develops a nested horizontal well system consisting of seven wells installed under an adjacent property restaurant parking lot with a 140 foot blind bore. The project is one of dozens to be discussed at the 2019 Florida Remediation Conference in Orlando. See FRC preview story below.

Keys national marine sanctuary releases draft revised management plan

By ROY LAUGHLIN

This summer, the Florida Keys National Marine Sanctuary released a draft environmental impact statement titled "A Restoration Blueprint," explaining in detail its plans to update and modify several management components of the FKNMS.

The DEIS outlined four scenarios of increasing effort and complexity. The first and simplest is to do nothing. The remaining three scenarios—a "minimum," a middle-of-the-road, and an "enhanced" scenario—address similar issues but outline increasingly more complex efforts.

The "middle" scenario is their preferred option.

The three scenarios that proposed more management than the status quo have four components in common, but vary in implementation details.

All propose to increase the sanctuary area, currently encompassing 3,800 square miles.

Under the minimum plan, FKNMS proposed to add the Tortugas region's 743 square miles, increasing the total to 4,541 square miles.

The enhanced plan proposed to add both the Tortugas and the Pulley Ridge regions, 1,002 square miles, to increase the sanctuary's total to 4,800 square miles.

All three plans proposed adding four new regulations, differing only in the number of existing plan components they propose to update. The minimum, preferred and enhanced alternatives propose to update three, four or five existing regulations, respectively.

The FKNMS is currently divided into 57 zones dedicated to specific purposes and subject to different rules and management objectives. The minimum plan proposed 96 zones encompassing

1,129 square miles. The preferred alternative proposed 98 zones encompassing 1,141 square miles. The enhanced alternative held the number of zones steady, but increased their area to 1,433 square miles.

In addition to changing the number of zones, the DEIS proposes establishing a "marine zoning scheme," with five zone types including wildlife management areas, sanctuary preservation areas, special use areas, ecological reserves and existing management areas for areas established prior to 1997.

2019 Conference Preview: FRC: After 25 years, still going strong

By ROY LAUGHLIN

Jim Langenbach, PE, BCEE, senior principal at Geosyntec Consultants Inc. in Titusville and FRC conference chair, is fired up about this year's Florida Remediation Conference set for Nov. 7-8 in Orlando.

FRC's technical program has been broadened over the past few years and now features more talks and speakers than ever. Add to that more companies in the exhibit hall and more opportunities to network, and it's easy to see why the number of participants has been on the rise.

FRC remains the Southeast's must-attend event for soil and groundwater cleanup professionals.

And to celebrate its 25th year, the conference will be conducted in a resort setting at the Omni Orlando Resort at ChampionsGate.

The talks

The FRC 2019 line-up features remediation case studies, amendment delivery technologies and innovative remedial approaches in sessions that

Within those zones, the three preferred alternatives vary in how funding will be budgeted for them and to what extent they eliminate exceptions, apply more protective regulations and make existing regulations more protective.

The report specifically noted that more protection will mean a greater number of no-entry areas or transit-only areas.

All scenarios endorsed the Proposed

FKNMS
Continued on Page 7

should provide areas of interest to all, said Langenbach in characterizing the breadth of the technical sessions. In 25 years, the technical presentations have evolved from pump-and-treat to sophisticated treatment train techniques and extensive site modeling.

Both days of the conference kick off with a keynote address.

Day One's keynote address, "NASA Kennedy Space Center's Remediation Program, a Perspective on 25 Years of Challenges, Innovations and Progress," will be presented by Michael J. Deliz, PG, remediation program manager at NASA John F. Kennedy Space Center.

"I'm excited about our opening keynote address this year about NASA's remediation program at the Kennedy Space Center," said Langenbach.

NASA contractors and representatives of its technology transfer have been FRC regulars for many years and have been on stage several times along the way explaining the sophisticated re-

FRC
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EPA releases policy for enhancing federal-state cooperation on enforcement

Staff report

After a year and a half of effort and consultation with state agencies, the U.S. Environmental Protection Agency released its final policy on federal-state cooperative enforcement activities, "Enhancing Effective Partnerships between the EPA and the States in Civil Enforcement and Compliance Assurance Work."

According to Susan Bodine, EPA's assistant administrator for enforcement and compliance assurance, the final policy clarifies roles and procedures to guide EPA and state agencies working to increase compliance with environmental regulations.

The final guidance includes three sections. The first characterizes the requirements for joint planning and regular communication between EPA and states to promote enhanced, shared accountability. The second delves into greater detail on EPA and state roles and responsibilities to implement authorized programs. The third characterizes a process for elevation and resolution of issues.

The new policy became effective in mid-July.

Chemical tracker. The EPA will make additional information available to the public on regulated chemicals through a new online tool, its "chemical review status tracker."

The tracker allows citizens to search monthly updates for any active pre-manufacture notice, significant new use notice or microbial commercial activity notice.

The goal, according to a statement attributed to EPA Administrator Andrew Wheeler, is to help the public more easily track a new chemical's status within the EPA review process.

The recently added tool allows users to download a spreadsheet that lists all active cases and case status. In the past, the EPA has presented only summaries of the number of cases in each step of its chemical review process, but did not identify case numbers.

The agency will continue to make available its existing status tables that provide the received date, the interim status

and final determination for each case reviewed by the EPA since the 2016 amendments to the Toxic Substances Control Act.

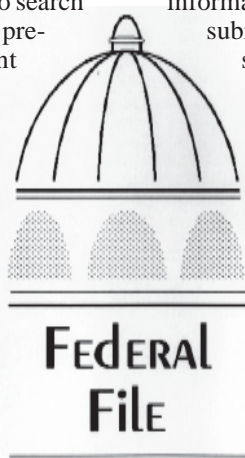
The new system will not provide information deemed "confidential business information," designated as such by the submitter, an omission that can substantially restrict public access to significant information about chemicals.

This year, the EPA also began publishing all new chemical notices and their attachments and information about TSCA Confidential Business Information Claim reviews.

No new requirements for CWA spill prevention. In late August, EPA Administrator Wheeler signed a final action establishing no new regulatory requirements under the Clean Water Act, Section 311(j)(1)(C).

This section grants EPA authority for hazardous substances discharge prevention.

Wheeler said that an EPA analysis



"concluded that current requirements for hazardous substance discharge prevention are protective of human health and the environment and, therefore, no additional requirements are necessary."

That conclusion was reached after a review of existing EPA programs, accounting for the frequency and impacts of reported CWA hazardous substance discharges.

The final action was based on public comments regarding EPA's proposed approach, according to an agency press release.

Cecil Field excellence. Cecil Airport in Jacksonville, formerly the Cecil Field Naval Air Station, received the National Federal Facility Excellence in Site Reuse Award.

The former Navy airfield is now an airport that serves corporate aircraft, general aviation, air cargo and National Guard and Reserve aviation operations.

It also is the site of the city of Jacksonville's Cecil Commerce Center, comprised of 31 million square feet of commercial and industrial space.

The converted airport, including the Cecil Commerce Center, is now the site of 6,225 jobs.

This awards program, now in its second year, acknowledges notable redevelopment activities on federal properties made available for private redevelopment and reuse.

Four categories of federal facilities are eligible to receive these awards: Superfund National Priority List sites, NPL Base Realignment and Closure sites, non-NPL BRAC sites and non-NPL sites.

Cecil Airport was one of two sites that had been on the Superfund NPL. The EPA gave four awards this year, two each to former NPL sites and non-NPL sites.

EPA small business funding. Mainstream Engineering Corp. in Rockledge and PTP Strategy LLC in Gainesville were among 21 small businesses nationwide to receive EPA Small Business Innovative Research grants.

Mainstream's grant proposal, Field-Deployable Measurement of Fluorocarbons in Water, addressed the EPA's increasing interest in identifying and removing perfluoro compounds from water.

Mainstream's goal is to develop a tiny polymeric chip to measure the concentration of fluorocarbons in aqueous solutions down to 10 parts per trillion.

In Phase 2, the researchers propose to develop a photonic crystal polymer embedded in a sensor chip that exclusively binds perfluoro octanoic acid and perfluoro octanoic sulfate.

When the crystal binds the perfluoro compounds, specific optical signals can be used to determine the perfluoro compounds' concentration. The EPA provided \$100,000 for this project.

PTP's proposal, "CDD-SORT: A Next-Generation System to Detect Hazardous and Recyclable Materials and Discarded C&D Debris," proposed to develop and use computer-based vision techniques, machine learning algorithms and deep subject matter expertise in a machine that will sort construction and demolition debris.

The proposal cited the existence of 2,000 C&D operations nationally to justify the commercial prospects for their proposed product. The EPA approved \$99,995 for this project.

Florida's SBIR grant recipients this year rank among the top of high-tech concepts proposed for implementation to meet significant national needs.

Nationwide, EPA awarded \$2.3 million to 21 small businesses in its July, 2019 selection.

EPA revises NSR permitting. In August, the EPA proposed a new process to evaluate whether a New Source Review preconstruction permit is needed when an existing major-emitting facility operator

FEDFILE
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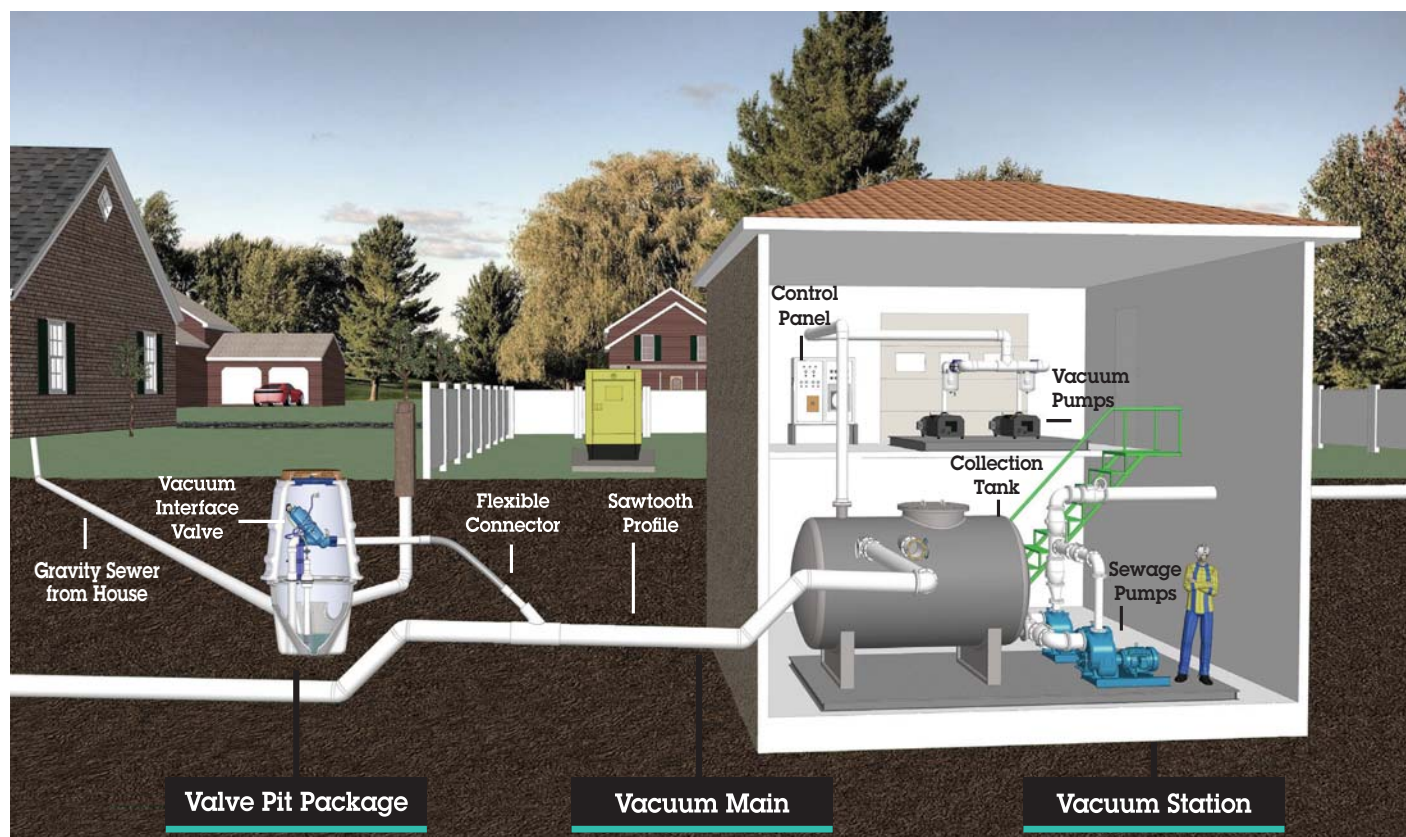


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Mississippi oil firm seeks permit to drill in Gulf County

Staff report

Spooner Petroleum Co. of Ridgeland, MS, applied for a permit this summer seeking the go-ahead to drill a 12,900-foot-deep exploratory oil well in Gulf County.

The well site is 8.5 miles west of the Chipola River and Dead Lakes, and two miles north of State Road 22. The proposed well is in the Wetappo Creek Watershed.

The Apalachicola Riverkeeper and other environmental advocates oppose the drilling project.

The Florida Fish and Wildlife Conservation Commission noted that the 4.65-acre drilling site contains 1.98 acres of uplands and 2.67 acres of wetlands.

Spooner initially reported the drilling site was not within a mile of any freshwater lake, river or stream.

The company modified its permit application on July 23, 2019, to indicate that the site is indeed within a mile of surface water.

In commenting on the application, FWC noted that no wildlife surveys were conducted for the application and recommended the survey before clearing and grubbing are started.

FWC conducted a geographic information system survey of the proposed well area, and said the site is located near, within or adjacent to potential habitat or occurrence locations for the Eastern indigo snake, gopher tortoise and Florida black bear.

Satellite Beach goes renewable. In August, the city of Satellite Beach became Florida's tenth city to commit to transitioning to 100 percent clean renewable energy by 2050.

Satellite Beach is the first community in Brevard County and 133rd in the U.S. to commit to the goal.

The city also committed to powering all city operations by renewables by 2032 and is pursuing conversion of its city hall and public works buildings to 100 percent solar in three years, by 2022.

Satellite Beach also engaged in Property Assessed Clean Energy financing with all four PACE funding providers in Florida.

PACE assists with the installation of solar panels, roof replacement, new heating and cooling systems, lighting improvements, water pumps, insulation, structural wind mitigation hardening and more for almost any kind of property—residential, commercial, industrial, nonprofit and agricultural.

PACE financing pays for 100 percent of a project's costs and is repaid over a period of up to 20 years through a voluntary non-ad valorem assessment added to the property's tax bill. PACE assessments remain with the property upon sale.

New TREEO courses available. The University of Florida Training, Research and Education for Environmental Occupations received approval for, and is now offering, five new online solid waste management courses including both initial training courses and refresher courses for experienced solid waste operators.

The courses include Initial Training for Operators of Landfills and Waste Processing Facilities, Initial Training for Landfill Operators and C&D Sites, Initial Training for Transfer Station Operators and Materials Recovery Facilities, and both 8- and 16-hour Refresher Training for Experienced Solid Waste Operators.

Chief resilience officer named. In August, Gov. Ron DeSantis named Stetson University graduate and Lake County native Julia Nesheiwat, PhD, as the state's first chief resilience officer.

The governor's office announced the CRO would prepare Florida for the environmental, physical and economic impacts of sea level rise.

Nesheiwat previously served as deputy special presidential envoy for hostage affairs with the U.S. Department of State.

Her credentials are undeniably impressive, particularly in military and intelli-

gence affairs, but lack environmental experience. Nesheiwat does have academic study in coastal urban rebuilding and some work experience in energy.

"Developing resilience goals for the state will help to protect our coastal communities and fortify Florida's pathway to continued prosperity," said DeSantis. "Dr. Nesheiwat's more than 20 years' experience operating at the highest levels of government and academia focusing on renewable energy, environmental and critical infrastructure issues make her an excellent choice for the position. She has a proven track record of public, private and military service that will serve Florida well."

The governor dismissed any criticism of Nesheiwat's lack of environmental credentials as "comments from the peanut gallery."

SJRWMD board members appointed. Gov. DeSantis appointed a new board member, Daniel Davis, and reappointed an existing board member, Ronald House, to the St. Johns River Water Management District Governing Board in August. Both appointments are subject to confirmation by the Florida Senate.

Davis is from Jacksonville and serves as president and chief executive officer of the Jacksonville Chamber of Commerce. He served as a member of the Jacksonville City Council from 2003 to 2010 where he was elected council president in 2007.

He later served as a legislator in the Florida House of Representatives from 2010 to 2014.

Ronald House is from Cocoa and is the owner and chief executive officer of Real Deal Development Group. He has

served on the SJRWMD Governing Board since 2015. He currently serves as board treasurer.

More people news. EHS Support announced the appointment of Ernie Marks as director of water resources.

In this position, Marks is tasked with providing leadership and technical direction to support clients' water resource needs and to expand EHS Support's capabilities in the water resources sector nationwide.

Marks is a former executive director of the South Florida Water Management District, and will be based in Palm City.

Lewis Environmental announced the appointment of Eric R. Brown as director of strategy and development for the Southeast U.S.

Brown is a former Lewis Environmental employee with 38 years of business leadership experience as a corporate strategist in private and public sectors. He will be based in their Lakeland office.

After 26 years of service, Charles Bucher retired from Groundwater Protection in Orlando.

In related news, Todd Hodgson returned to Groundwater Protection as part of its management team as partner.

He will be responsible for business development and the growth of the company's core business, and will assist with bid preparation and project scheduling as well as project management.

Cardno Inc. appointed Thomas Nogaj, PhD, as senior principal in their Clearwater office as part of its 2019 Technical Excellence Program. He has experience implementing and managing water and wastewater design and construction pro-

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Florida Notes



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State funding reactivates Red Tide Task Force after long hiatus

Staff report

In early August, Gov. Ron DeSantis formally announced the reactivation of Florida's Red Tide Task Force, whose members are researchers and scientists. The Florida Fish and Wildlife Conservation Commission manages the task force.

The task force, which has lain dormant for the past 15 years in the absence of funding, was revived this year with \$4.8 million from the state Legislature for FWC to support the task force's activities.

In a separate measure, the Legislature approved \$15 million for Mote Marine Laboratory, in \$3 million increments over five years, to fund studies of red tide causes and impacts.

Funds for water quality outreach.

The Florida Oceanographic Society in Stuart received a \$25,500 grant to increase public involvement in projects and activities that improve water quality in the St. Lucie Estuary and Indian River Lagoon.

Healthy living shorelines are a major focus of the proposed environmental stewardship effort. The society has been building living shorelines composed of integrated oyster reefs, marsh grasses and mangroves in the estuaries around Stuart.

The grant will allow them to construct more reefs by underwriting collection from local restaurants of a larger volume of oyster shells used to build the living shorelines.

The funding also supports a public outreach program encompassing education, research and advocacy. One classroom site for school groups and visitors will be the Florida Oceanographic Coastal Center in Stuart. Funding will support no-cost field trips to the Coastal Center.

The funding from Impact 100 Martin will provide two years of support for the Florida Oceanographic Society.

Palatka stormwater project. The city of Palatka received a major funding boost to the second phase of its South Historic District Stormwater Project—a \$1.5 million check from the St. Johns River Water Management District.

Under the second phase of the project, the city will install an exfiltration trench and stormwater conveyance pathways through 11 blocks of Palatka's South His-

toric District.

Aging stormwater pipes were replaced during the first phase of the project. The second phase is an upgrade of the two remaining discharge points not handled during phase 1 improvements.

The project's goal is to reduce nutrient releases to the St. Johns River. The SJRWMD estimates that the combined

phases will reduce total nitrogen loading by 128 pounds per year and total phosphorus loading by about 17 pounds per year.

When the project is complete, the city's South Historical District and an adjacent residential neighborhood will have new stormwater infrastructure and new potable water lines.

PRMRWSA infrastructure expansion. With its 2020 fiscal year budget approved, the Peace River Manasota Regional Water Supply Authority will begin construction of a six-mile pipeline connecting a water treatment plant in South DeSoto County with Punta Gorda's Shell Creek Water Treatment Plant.

The new pipeline will supplement an existing pipeline between the two treatment plants and create a loop that allows the city of Punta Gorda and the water supply authority to provide water to one another during emergencies.

After Hurricane Charlie in 2004, Punta Gorda was without drinking water for 10 days. The second pipeline is expected to prevent a recurrence of that following any future natural disaster.

In a second budgeted project, the authority will begin a \$60.7 million project to extend a water pipeline to Manatee County. The work approved will extend a pipeline near Sarasota County's landfill to Clark Road.

For improvements further into the future, the authority approved funding for a feasibility study, at a cost of \$250,000, to increase storage capacity at its Peace River Water Treatment Facility by adding a third reservoir.

The reservoir will be constructed on land owned by the Southwest Florida Water Management District.

One element of the feasibility study will be to determine the size of the new reservoir. It could cover up to one square mile and hold about six billion gallons of water.

The need for the new reservoir resulted from the authority's updated Peace River water withdrawal permit. The SWFWMD recently increased permitted withdrawals

to 258 million gallons per day during the wet season, contingent upon eventual construction of the new reservoir to hold the water.

The new water storage project is based on an expected future need to supply 80 million gallons of water per day to authority customers.

Leon County septic tank conversion.

To meet state demands to reduce nitrogen loading to the Wakulla Springs Basin, the Leon County Board of County Commissioners approved a grant program for property owners who upgrade their septic tanks to reduce nitrogen releases to groundwater. The grant will pay 100 percent of the cost to upgrade.

In one neighborhood, according to local news accounts, more than 80 percent of the property owners agreed to join the subsidy program to upgrade the tanks.

County officials hope the program will rapidly push the county over its goal of upgrading 500 septic tanks within five years between 2017 and 2021.

So far, property owners in Leon County have upgraded 186 septic tanks, and 350 more are in the design phase of upgrade.

Additional funds for McCoy Creek project.

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service Community-based Restoration Program has awarded \$357,280 to help finish the design of Phase 2 of the McCoy's Creek restoration plan in Jacksonville's downtown area.

The project under design will "daylight" the mouth of McCoy's Creek. Currently, the creek mouth to the St. Johns River is covered by a parking lot on the former *Florida Times-Union* newspaper property.

The renovation work will open the McCoy's mouth and replace an existing ditch with 4,000 feet of a soft bottom stream and living shoreline. The result will be a meandering creek.

The creek's mouth in the area of the existing parking lot will be bulkheaded, but it will be open and visible as a natural amenity.

The NOAA grant will also support a fish study by Jacksonville University and water quality sampling by the city of Jacksonville's Environmental Quality Division.

The project is part of a larger effort to redevelop Jacksonville's Emerald Trail, which will convert contaminated land to parks, playgrounds, trails and other public green space.

When completed, 2.8 miles of creek and 142 acres of land will be redeveloped. The project has been budgeted for \$60 million over the next three years.

Groundwork Jacksonville is the operating entity for the restoration effort. It has already received a \$250,000 grant from the National Fish and Wildlife Federation and NOAA's National Coastal Resilience Fund for restoration design of the north and south branches of McCoy's Creek.

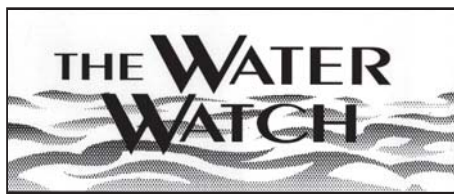
Groundwork Jacksonville needs an additional \$450,000 to complete the design. Wood Environmental & Infrastructure Solutions Inc., SCAPE and CDM Smith are partnering on the McCoy Creek restoration design.


Volusia Blue Spring recharge. An abandoned borrow pit just east of Volusia Blue Spring State Park is being considered for conversion to an aquifer recharge site to benefit flows at adjacent Blue Spring.

In late August, the Volusia County Council voted unanimously to hire a consultant to evaluate the site's potential as a reservoir that could replenish the springshed's aquifer.

The idea is to pass stormwater through a series of planted wetlands to remove nutrients and other contaminants, and then store the cleansed water in a borrow pit reservoir to allow percolation into the aquifer.

WATCH
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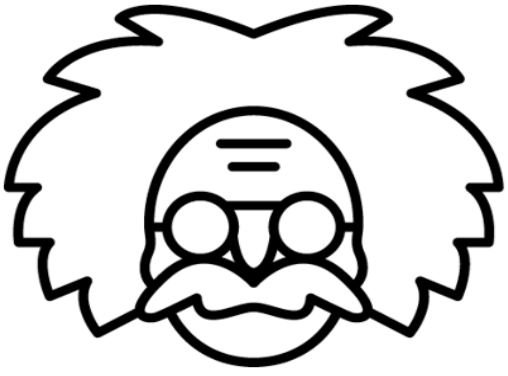
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November 7-8, 2019

Omni Orlando Resort at Championsgate
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Day One, Thursday, Nov. 7, 2019

Opening Session

9:00 **A Word from the Chair**
Jim Langenbach, PE, BCEE, Senior Principal
Geosyntec Consultants Inc., Titusville

Keynote Address

**NASA Kennedy Space Center's Remediation Program,
a Perspective on 25 Years of Challenges, Innovations and Progress**
Michael J. Deliz, PG, Remediation Program Manager
NASA John F. Kennedy Space Center

Break: 10:00 - 10:30

Session 2: Advancing the Understanding of PFAS and Emerging Contaminants

10:30 **PFAS: Navigating Challenges, Best Practices and Current Affairs**
Karla Buechler, Corporate Technical Director
Eurofins Test America, Sacramento, CA

PFAS are a family of synthetic fluorinated compounds that have been mass produced in the U.S. for decades dating back to the 1950s. PFAS are used in a wide variety of industrial and commercial applications such as textiles, aqueous film forming foams, metal plating, semiconductors, paper and food packaging, coating additives, cleaning products, pesticides and personal care products. According to the U.S. Environmental Protection Agency, PFOA and PFOS pose potential adverse impacts to the environment and human health due to the bioaccumulative and persistent nature of the compounds. Production of the "legacy" long-carbon-chain molecules was largely phased out beginning in 2002 and over the course of the next thirteen years. The manufacturing of the next generation of fluorinated chemicals has brought new PFAS chemicals to the forefront of discussion, but little is known about their potential impact to human health. The chemistry of PFAS is unique and challenging. There is currently no consensus best method for all environmental matrices, but a multitude of varying approaches. This soup of non-validated methods and analytical approaches has left stakeholders with the challenging job of navigating their options and making the right choice for their project objectives. In the absence of federal regulation and guidance, and alongside the variations in analytical techniques, we see growing variation in actions being taken at the state level. States have proposed or promulgated limits for various compounds, all being different from one another and for differing matrices or programs. This presentation will provide an introduction to the chemistry, sources, history and regulation of PFAS, and aims to provide clarity around the mountain of analytical options and growing regulations.

10:45 **A Vertical Recirculation Well System for In-Situ Removal of PFAS**
William Kerfoot, PhD, Principal, Kerfoot Technologies Inc., Mashpee, MA
In the early 2000s, vertical recirculation wells injecting microbubble ozone were successfully tested to remove PCE and DCE to below MCLs for site closure. A modification of the recirculation well has been designed to inject peroxide-coated micro to nanobubble ozone to remediate PFAS from saturated soil and groundwater. The well is composed of a lower injection point that reduces adsorbed soil fractions and a four-inch overlying double well screen recirculation well. The pilot test location was divided into equal regions, the first containing the vertical recirculation well. A fraction of the recirculated groundwater containing residual Perozone®-3.0 is directed to an above-ground canister containing adsorbent and activated carbon. The cleaned water is redirected to the outer cycle of incoming water. The adsorbed fraction within the canister of residual PFAS is decomposed in place at such a rate to not immediately require replacement of the activated carbon. The second region employed a standard pumping of groundwater to an activated carbon canister with return flow back to its side of the chamber. The well system has been tested on soils and groundwater contaminated by the first generation of fire-fighting foam, dominated by PFOS, PFHxS, PFHxA, PFOA and PFHpS. Precursors consisting of 6:2 and 8:2 fluorotelomer sulfonates were shown to be decomposed during injection. Groundwater pH was controlled within 6.0 to 7.5. Fluoride production was monitored during PFOS decomposition. Advances in groundwater flow measurement can depict and define the hydrogeological containment.

11:00 **Cometabolic Treatment of Emerging Groundwater Contaminants**
Paul Hatzinger, PhD, Director, Biotechnology Development and Applications Group
Aptim Federal Services LLC, Lawrenceville, NJ
Aerobic cometabolism can be a highly effective approach for the remediation of a variety of different emerging contaminants in groundwater, including 1,4-dioxane, 1,2-dibromoethane and N-nitrosodimethylamine. This approach is also applicable for numerous chlorinated solvents and their typical anaerobic degradation products, including trichloroethene, vinyl chloride and cis-dichloroethene. Cometabolic treatment typically entails adding air or oxygen and one of several different gases, e.g., methane, propane, ethane or ethene, that serve as primary growth substrates to an aquifer or bioreactor. Specific groups of bacteria with broad-specificity oxygenase enzymes utilize these gaseous substrates and cometabolically degrade the contaminants of concern. This approach is particularly attractive at sites in which initial contaminant concentrations are low and/or where the production of secondary products from anaerobic treatment approaches, e.g., sulfide, methane or dissolved metals, is undesirable. Recent laboratory and field studies conducted by our research group show that contaminants such as EDB and NDMA can be reduced to low part-per-trillion concentrations using this process. Factors that can influence the success or failure of cometabolic treatment include groundwater pH, the presence of adequate macro- and micro-nutrients and gas purity, among others. The method of distributing a primary substrate and nutrients where

applicable is also critical to the efficacy of cometabolic treatment. Biosparging and groundwater recirculation with gas addition have proven very successful for in-situ field implementation. This presentation will provide an overview of the fundamentals of cometabolic processes and examples of successful field applications of this technology for treating 1,4-D, NDMA and EDB.

11:15 **PFAS in Groundwater – Remediation Options**
Viraj deSilva, PhD, PE, BCEE, Wastewater Treatment Director
SCS Engineers, Tampa
Contaminants of emerging concern, including per- and polyfluoroalkyl substances, are of interest to regulators, water treatment utilities, the general public and scientists. The chemical properties that make PFAS compounds ideal for fighting fires and repelling water also make them challenging to remediate using conventional techniques. While ex-situ technologies are viable, care must be taken to select treatment processes and design systems that are both effective and economically viable. Current ex-situ technologies rely on the removal of PFAS from aqueous solution using various binding agents in combination with adsorbent media and/or reverse osmosis membranes. Once PFAS have concentrated within treatment media or concentrate streams, the resulting concentrate must be incinerated, landfilled or otherwise disposed of. The following alternatives for the treatment of PFAS will be presented in detail along with case studies and removal efficiencies: 1) GAC treatment, 2) Ion exchange treatment and 3) Reverse osmosis treatment. With the EPA positioned to take serious action on PFAS in late 2019, regulators in many states have already begun implementing measures of their own, while state and federal courts are beginning to address legal issues surrounding this emerging contaminant. These changes mean new potential liabilities and consequences for organizations that manufacture, use or sell PFAS or PFAS-containing products. The time to take action to protect your operations is now.

11:30 **PFAS Sites: How Uncertainties in Site Identification Influence Sampling Design and Remediation Strategies**
Rosa Gwinn, PhD, PG, Resource & Technology Manager, AECOM, Germantown, MD
In response to evolving federal and state drinking water regulations, many property owners are evaluating the potential presence of per- and polyfluoroalkyl substances from historic site practices. In response to regulatory requirements or public pressure, property owners are proactively evaluating their PFAS liabilities. Moreover, if a PFAS source negatively affects drinking water, then owners need to understand the magnitude of the source and the potential mitigation options. AECOM has performed hundreds of facility assessments for PFAS and will share this experience and how it affects remediation planning. Because releases of PFAS occurred years ago, there is inherent uncertainty in specifying the size, location and magnitude of potential sources of the regulated long-chain PFAS in the environment. Delineating

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2019 FRC Schedule of Events

Wednesday, Nov. 6, 2019

10th Annual FRC Charity Golf Tournament at ChampionsGate Golf Club
10:00 pm Registration opens for FRC 2019 Charity Golf Tournament
12:00 pm Play begins
5:30 pm Post-play BBQ Awards Ceremony at the golf club

25th Annual Florida Remediation Conference at Omni Orlando Resort
5:00 pm - 9:00 pm FRC Exhibitor Move-in, Omni Orlando Resort's
Osceola County Conference Center
4:00 pm - 9:00 pm Registration desk open at the Omni Orlando Resort's
Osceola County Conference Center

Thursday, Nov. 7, 2019

25th Annual Florida Remediation Conference, Day One

7:30 am - 5:00 pm Registration desk open at Omni Orlando Resort's
Osceola County Conference Center
7:30 am - 9:30 am Coffee/munchies in exhibit area
7:30 am - 7:00 pm Exhibit hall open
9:00 am Day One, FRC conference convenes
5:00 pm Conference adjourns for the day
5:00 - 6:30 pm FRC Reception in FRC Exhibit Hall

Friday, Nov. 8, 2019

25th Annual Florida Remediation Conference, Day Two

7:30 am - 5:00 pm Registration/help desk open at Omni Orlando Resort's
Osceola County Conference Center
7:30 am - 9:30 am Coffee/munchies in exhibit area
7:30 am - 12:00 pm Exhibit hall open
8:30 am Day Two, FRC conference continues
12:00 - 12:30 pm FRC Exhibitor Breakdown
5:00 pm 2019 FRC conference adjourns



Current List of Exhibitors and Sponsors

Action Environmental
Adler Tank Rentals
Advanced Environmental Laboratories
AirQuest/GeoQuest
Alpha-Omega Training & Compliance
ALS
APTIM Environment & Infrastructure
AST Environmental
Betts Environmental
Blackline Safety
Carbon Service & Equipment Co.
Carbonworks USA LLC
Carus Corporation
Cascade
Clark Environmental Inc.
Clean Earth
Clean Harbors
Clean Vapor Inc.
Cliff Berry Inc.
Custom Drilling Services Inc.
Dakota Technologies
DeWind One Pass Trenching
Dexsil Corp.
Directional Technologies
EDR
Ellingson - DTD
Enviro-Equipment
EON Products
EOS Remediation
ERIS - Environmental Risk Information Services
ESD Waste2Water
ETEC LLC
EthicalChem
Eurofins TestAmerica Laboratories
Evoqua Water Technologies
Exo Tech Inc.
Ferrate Solutions
Florida Equipment And Restoration Inc.
Florida Specifier
Fruits & Associates Inc.
Geo-Solutions
Geoprobe Systems
GeoSearch
Geosyntec Consultants
Geotech Environmental Equipment
Geotek Services LLC
Geoview Inc.
GFA International
Golder Associates
Groundwater Protection
HEPACO LLC
Heritage Environmental Services
Hilltop Environmental Solutions
Hoganas Environmental Solutions
Horizon Environmental Services
Hull's Environmental Services
Huss Drilling
Hydroseeding Solutions
Industrial Vacuum Services Inc.
Johnson Screens
JRW Bioremediation
Jupiter Environmental Laboratories
Lewis Environmental
LMS Manufacturing
Moran Environmental Recovery
NASA Kennedy Space Center
NRC Gulf Environmental Services Inc.
Pace Analytical Services
Perma-Fix of Florida
PeroxyChem
Petroleum Resources & Development Inc.
Petrotech Southeast
Pine Environmental Services
Preferred Drilling Solutions
Product Recovery Management
Provectus Environmental Products
QED Environmental Systems
RC Development Group
Regensis
Remedial Systems Integrated LLC
Republic Services
Ridge Environmental Solutions
RNAS Remediation Products
SGS North America
SiREM
SWIX
Terra Systems
Terracon Consultants
TerraStryke Products LLC
Tersus Environmental
The Goldstein Environmental Law Firm
The Sustainable Workplace Alliance
Total Vapor Solutions
TRC Environmental Corp.
Trihydro
TRS Group Inc.
UniRem Technology LLC
United Rentals Fluid Solutions
Universal Engineering Sciences
US Ecology
US Environmental Rental
Vapor Pin Enterprises
Vertebrae Well Systems
Walker-Hill Environmental
Waste Connections
Waste Management
XENCO

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groundwater impacts against the federal lifetime health advisories for drinking water is straightforward, but there is no regulatory driver against which to delineate soil or source zones. Instead, we will share statistical strategies for evaluating PFAS distribution that provide quantitative bounds on confidence. Mitigation may take the form of remediation or intervention. The site sampling strategy for bounding uncertainty informs which of the available mitigation technologies may be of benefit at a site. Sorption technology is conventional and readily scalable with the most field demonstrations worldwide. However, the disposal of spent adsorbents is associated with off-site liability. As for destructive technologies, only a few of them are proven effective or partially effective for PFAS, due to the unique chemical and physical properties of target compounds. This presentation will summarize the available PFAS remedial technologies for both water and soil treatment and provide information about their demonstration results, state of development and advantages, as well as their limitations.

11:45 **Analytical Review of High Concentration PFAS Treatment Projects**
AnnieLu DeWitt, Remediation Tech. Business Development Manager, Environmental Services
Clean Harbors, South Portland, ME

This presentation will relate the unique properties of high concentration PFAS treatment in wastewaters from multiple sources of AFFF releases in an industrial application, and review the challenges of taking very high concentration parts per billion and parts per million level influent water to non-detect effluents. It will also provide a review of the unique additional analyticals required to evaluate high concentration complex wastewaters and discuss how baseline analytical review can be applied to a broad range of high concentration sources. Analytical results from three different projects will be reviewed as well as the specific PFAS compounds most commonly found in different applications and breakthrough predictions based on structure and concentration.

12:00 - 1:00 **Day One Luncheon**

Sponsored by Advanced Environmental Laboratories

Session 3: Refining Conceptual Site Model Strategies

1:00 **Building Useful Conceptual Site Models Using 3D Modeling Technology**

Jim Depa, Senior Project Manager
St. John-Mittelhauser & Associates, a Terracon Company, Chicago, IL

A conceptual site model is a regulatory requirement for many large-scale environmental remediation projects, and acceptable CSMs can be built from nearly any type of field collected data. The objective was to use 3D modeling technology to build detailed, understandable and useful CSMs on three environmental investigation projects using different types of analytical and geophysical data. CSM #1 – Soil Analytical Data: A 3D volumetric model was built using soil analytical data from eight different contaminants of concern. Each contaminant was modeled individually and then combined to show the 3D volume of soil above each contaminant's applicable remediation objective. The CSM accurately calculated the volume of impacted soil and ensured that all the remedial exceedances were accounted for. CSM #2 – Geologic Data and Groundwater Elevation Data: A 3D hydrogeologic model was built from boring logs and groundwater elevation data from gauging events. The CSM explained how the interaction between the groundwater table and a thin clay unit in the subsurface created locations where free-phase LNAPL was being confined below the clay layer at some locations and collecting above it in others. CSM #3 – Laser Induced Fluorescence and Cone Penetrometer Test Data: A high-resolution 3D model was built from over 30,000 LIF and CPT data points. The CSM identified two very different sources of petroleum contamination based on their waveform signature and showed how the geology effected the migration of contamination in the subsurface.

1:20 **New Geophysical Imaging Tool for Environmental Site Assessment**

David Harro, PG, Director, Geologic Services, G3 Group, Odessa

Much of Florida is underlined by limestone aquifers. Erosional process affecting these aquifers results in the formation of sinkholes and karstic limestone. These karst formations are extensive and encompass entire physiographic regions. The weathering process in karst environment in many cases produces sinkholes that penetrate existing confining units, creating access into deeper aquifer system. Sinkholes are geologic hazards that are making the national news in Florida each year. Despite their notoriety, sinkholes are not often investigated on environmental sites that are in karst regions. The development of karst or sinkholes can provide vertical pathways directly into the Floridian Aquifer, our current primary source of drinking water. This pathway is directed into a focused area between the upper unconsolidated material and the limestone. The focused area is known as the throat of the sinkhole. One of the reasons that investigation of potential sinkholes on environmental impacted sites is not frequently performed is the inability to identify the locations of sinkhole or the throat of a sinkhole. In the past few years, a new approach to imaging the deep subsurface has become available. The multi-electrode resistivity implant technique, or MERIT, has been proven to provide high resolution geophysical imaging over conventional surface geophysical techniques. MERIT utilizes permeant implants that are placed in the subsurface using direct-push. The tomographic configuration of MERIT provides up to five-times higher resolution and twice the depth of standard electrical resistivity. Applications of this geophysical technology include imaging sinkholes, chemical injection and air injections, fate and transport modeling using MODFLOW or other finite element/difference models. The presentation will demonstrate the capability of the MERIT geophysical technology in case studies and lessons learned.

1:40 **Changing the Perspective on 30 Years of Granularity with HRCD**

Robert Schatzman, PG, Senior Project Manager, L.S. Sims and Associates Inc., Rockledge
Lance Robinson, PE, Chief Technology Officer, EN Rx Inc., Parrish

Monitoring well placement and spacing can be arbitrary and is often driven by practicality, feasibility and/or cost. Even in open areas, data gaps can exist due to cost saving practices. New technologies have remarkably improved the quality, quantity and density of data collection in the vertical profile. However, the horizontal layout remains compromised by cost and historical perspectives for practicality. The result of insufficient data quantity is never better than expected. The aerial averaging required when using data collected from only a vertical sampling regime can often lead to cost increases and failure. Vertebrae™ Well Systems are horizontal well systems capable of producing high resolution contaminant distribution data sets. The case study presented will illustrate how understanding the contaminant distribution horizontally is critical to site treatment. An Orlando area former dry-cleaning site has been characterized with shallow and intermediate plumes of 400 to 700 feet in length with different flow vectors. Vertebrae well systems installed to aid in defining the magnitude and extent of contamination added significant information that more precisely defined both plumes. This presentation will show how Vertebrae was unaffected by obstacles at the site and identified contaminant plumes properly under a strip shopping plaza and a four-lane highway. Vertebrae well systems are an effective tool to provide treatment but, more importantly, Vertebrae wells have the potential to provide more data to improve the conceptual site model allowing for better selection of a remedial strategy. Proper use of this tool during assessment can be critical in reaching site cleanup goals.

2:00 **Vapor Intrusion: How Many Vapor Samples Are Enough?**

Jim Fineis, PG, President, Total Vapor Solutions, Alpharetta, GA

Vapor intrusion continues to be a driving force in environmental investigations. There are many challenges that occur in conducting vapor intrusion investigations on either existing structures or undeveloped land. The primary questions that arise are: how many samples do we need to collect and where do we need to collect them? Developing a consistent and systematic approach to these questions will allow for company-wide consistency, statewide consistency and, importantly, will provide a bank lender with a level of assurance that enough samples have been collected. To achieve this goal, an extensive review of existing state guidelines was conducted and, based on the results of this research, a simple-to-use table was developed to help determine the proper number of samples to be collected. Where to collect the

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Management Plan explained in detail in the documents released in August.

Some new or expanded rules in the plan include designating all sanctuary water as “no discharge zones;” expanded protection for sanctuary historical resources; new operating vessel regulations; tighter restrictions on coral removal, injury or possession; a mooring buoy program; and a joint enforcement agreement with the state for sanctuary regulation enforcement.

The new DEIS also proposed continuation and expansion of collaborative research and monitoring. It highlighted programs in water quality, seagrass and coral reefs, specific species and fishery resources informed by scientific findings of the continuing cooperative research.

The DEIS succinctly justified the urgency for the update.

“The need for the proposed action is based on widespread, acute, chronic and emerging threats to marine resources and federal trust resources in the Florida Keys,” it noted. “The existing marine zones and management plan activities designed and implemented by FKNMS in the mid-1990s are no longer sufficient to ensure long-term resource protection and ecosystem function into the future considering those threats.”

That statement referenced a 2011 condition report that described natural resources in the Keys as “in fair to fair/poor condition, either stable or in decline.”

The DEIS presented an extensive cost-benefit analysis that brought some notable numbers into the discussion. An increase in tourism is proposed as the greatest benefit of the management plans.

Under the preferred alternative, direct expenditures, primarily to tour companies, could increase to \$144 million, and could

bring up to a million more tourists annually to the Keys and 2,000 jobs could be added.

The primary adverse impacts would be felt by commercial and sports fishermen, and tour companies servicing areas with proposed restricted access.

They could see a loss of \$8.2 million of aggregate income and up to \$17.2 million in sales. All three of the proposed scenarios result in similar job and income losses from affected economic sector.

The net economic benefits, according to the DEIS, could be as high as \$130 million for direct expenditures and \$63 million of income within Monroe County, and could account for as many as 1,776 jobs within the county.

WATCH

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If the consultant’s findings indicate the proposed plan is feasible, the cities of Deltona, DeLand and Orange City will split the project’s \$10 million to \$12 million construction cost with Volusia County.

Their shares will be prorated in proportion to the amount of water each utility withdraws from the Floridan Aquifer. The Florida Department of Environmental Protection and the St. Johns River Water Management District would pay the remaining project costs.

Although local utilities and state authorities are publicly in favor of the project, some environmental advocates are wary of it because there are no other instances where aquifer recharge reservoirs have been constructed so close to the springs they are intended to nourish.

Potable water reuse in Tampa. At its September meeting, Tampa City Council members voted 5-2 to remove the Tampa Augmentation Project from the city’s bud-

Favoring a shift from fishing to tourism is not without some irony. The 2011 FKNMS condition report noted that increasing coastal and visitor populations, and the recreational use of the sanctuary was a major factor in its decline.

The planning has progressed a long way since the process began in 2011 but is still not near a conclusion.

“NOAA will synthesize comments to a singular proposal that will then be put out for additional comment before a final rule will be established,” said Gena Parsons, communications and outreach manager for National Marine Sanctuary Foundation in support of Florida Keys National Marine Sanctuary. “We hope to have that

get next year.

The project intended to pump highly treated wastewater into the Floridan Aquifer and later withdraw it as supply for a potable water treatment plant.

Tampa Mayor Jane Castor formally announced that the reuse plan is off the budget a few days following the council vote. The \$300 million recharge project was defeated largely due to public opposition and competing city budget priorities.

Leak detection robots in St. Pete. The city of St. Petersburg approved a \$600,000 contract with RedZone Robotics to supply its utilities department with robots to inspect underground wastewater collection pipes to pinpoint where repair is needed.

The autonomous crawling robots offer the advantage of detecting leaks faster than the inspection methods currently in use.

They can survey up to 10,000 linear feet daily, five times the 2,000 feet of daily inspections that CCTV can handle.

The robots rely on video cameras, sonar and radar to determine pipe conditions.

next singular proposal (environmental impact statement) complete within a year of this comment period.”

When the final rule draft is released, it will be followed by a public comment period with potential rule adjustments based on comments. Parsons noted that the public is not being asked to endorse a single alternative in its entirety and that implementation will likely not be made along only one alternative’s boundary.

For example, public comments could uniformly favor expanding the FKNMS area maximally while not favoring the other related proposed changes. This could be largely reflected in the updated management plan.

Effluent in Santa Rosa Sound. In late August, Santa Rosa County Board of County Commissioners and managers of the privately-owned Holley Navarre Water System signed an agreement for joint pipeline construction that in as little as two years could end treated wastewater discharges into the Santa Rosa Sound.

The agreement authorized a shared pipeline from HNWS’ wastewater treatment plant in Navarre Beach to 200 acres of leased land at Eglin Air Force Base.

Navarre Beach’s wastewater plant effluent will then be released into Santa Rosa’s planned rapid infiltration facility.

Navarre Beach, on the narrow barrier island, has no other plant location or any other option for its wastewater effluent disposal. The agreement provides Navarre Beach residents and HNWS the opportunity to end wastewater releases to the sound.

The county will pay \$13 million of the expected \$20 million construction cost, while HNWS will pay \$7 million.

Construction will begin next year.

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samples on a site is a more complex issue but providing a basic understanding of how vapor moves and what role if any biodegradation plays in where samples should be collected helps answer this question. A brief discussion will be provided regarding what role the current or future building type plays in the decision. What effect the source of the potential vapors has on the sampling locations, as well as the purpose of the samples, play a big role in determining the correct placement of the sample locations. Providing a basic understanding of these two issues allows for a better and more complete vapor intrusion assessment.

2:20 **Chemical Speciation: Insights for Site Assessment and Closure Strategies**

Nick Barnes, PE, Project Engineer, HSW Engineering Inc., Tampa

Zeke He, PhD, PE, Environmental Engineer, HSW Engineering Inc., Orlando

Contaminant compounds may be sequestered through adsorption, (co)precipitation and/or complexation, greatly affecting their potential uptake by humans and other receptors. Due to the changes in bioavailability and toxicity endpoints associated with variations in chemical speciation and oxidation forms, the potential risks and hazards associated with a contaminant in soil or water are often lower than if the contaminant is directly provided to humans or other receptors. In this presentation, we will present an overview of chemical speciation and its adaptations to environmental assessment and cleanup. For example, the toxicity of hexavalent state chromium, chromate or Cr(VI), is two orders of magnitude more than that of the lower oxidation form Cr(III). Conversion of Cr(VI) to relatively less toxic and mobile Cr(III) may be applied for chromate contamination management. The complexity and toxicity of cyanide chemistry make its management and remediation extremely challenging. With an insightful understanding of cyanide’s speciation and associated toxicity endpoints, costs and timeframe associated with assessment and remediation can potentially be decreased, while achieving the same desired level of protection. Case studies of chemical speciation as applied to site assessment and risk-based remediation strategies will be presented.

2:40 **Chlorinated Solvent Forensics: Applying Multiple Lines of Evidence**

Joshua Richards, PG, CHMM, Program Manager, Pace Analytical Services LLC, Indianapolis, IN

Utilizing environmental forensics can be beneficial when standard remedial practice and analytical data indicate complex situations are occurring. These complexities could be multiple sources under the same remedial umbrella, off-site contributions or comingled plumes, as well as stalled remediation projects. When implementing chlorinated solvent forensics, mainly via compound specific isotope analysis, complex sites can be progressed. The use of multiple assessment tools, in addition to CSIA, is beneficial to complete conceptual site models and close any data gaps that limit remedial progress. A two-dimensional look utilizing CSIA can substantiate ongoing remedial activities and give light to fine-tuning remedial action plans. This presentation will evaluate a complex site for source determination and timing of release utilizing an advanced site characterization tooling with the final argument solidified by CSIA indicating multiple off-site sources present.

Break: 3:00 - 3:30

Concurrent Session 4A: Speed Talks

3:30 **Well Flow Dynamics During Groundwater Sampling: A Comparison of Purge and Passive Sampling Approaches**

Sanford Britt, PG, CHG, Senior Hydrogeologist, QED Environmental Systems Inc., Dexter, MI

Contaminated groundwater decision trees depend on accurate and reliable groundwater sampling data. Low flow purging and sampling techniques were introduced to improve sampling data, limit purge volumes, reduce turbidity and agitation during sampling, and to improve repeatability. Passive, no-purge, approaches have likewise been introduced to improve sampling by limiting waste generation and improving cost structures. How do these methods reflect aquifer concentrations? Do they represent aquifer concentrations differently? How do the different approaches assure reliable groundwater data for remedial decision-making? U.S. Department of Defense Strategic Environmental Research and Development Program Project ER-1704 tested passive and dynamic sampling procedures in the lab, in the field and in model domains to better understand flow dynamics in wells. Results describe a flow field where water flows largely horizontally from the formation to the well, then flows vertically in the well bore to the pump intake during pumping, and also vertically due to tiny density contrasts when not pumping. Sampling results rely on these downhole flow dynamics. Normally, these effects are not known. Passive sampling approaches regularly yield similar results without purging, but care is necessary to understand whether stratification in the aquifer is maintained

or homogenized in the unpurged well, or if stratification is partially maintained. Determination of these effects requires substantial effort and is probably not warranted for standard monitoring. However, the study is informative in that it explains some of the dynamics associated with why passive and active samples often yield similar chemical results and illustrates why practitioners must always pay attention to seemingly unimportant details such as slow purge parameter drift.

3:40 **Site Assessment Techniques with Vapor Pin**

Laurie Chilcote, Managing Director, Vapor Pin Enterprises, Plain City, OH

The Vapor Pin® is a high-quality, reliable sampling device that is installed in minutes using commonly available hand tools. Once installed, the leak-proof Vapor Pin is suitable for locating VOC sources below hard surfaces, collecting high-resolution data sets, differential pressure testing, radon mitigation testing, stray gas evaluations, sub-slab soil gas sampling, long term monitoring, continuous monitoring, vapor intrusion assessments and methane sampling on landfills. The Vapor Pin is also reusable. The fact that Vapor Pin is installed in a rapid, yet minimally intrusive manner, allows practitioners to cost-effectively gather high resolution active soil gas data sets. This increased site coverage provides a better understanding of the spatial variability beneath sites. A major advantage the Vapor Pin over other sub-slab vapor ports is that a leak-proof seal between the port and the concrete is formed immediately by the silicon sleeve that covers its outer edge. The FLX-VP Vapor Pin allows connection to a variety of sampling devices through a barb fitting, Swagelok® compression fitting, or quick connect valve. As a result, the Vapor Pin can be quickly and reliably connected to a wide variety of vapor screening instruments, evacuated canisters, bottle vacs, absorbent tubes, manometers, etc. In addition, a variety of attachments have been developed to allow for the collection of soil gas samples at greater depths and isolate VOC-impacted slabs. The Vapor Pin has become the standard tool for sub-slab investigations with tens of thousands in use in North America, South America, Australia, Europe, Africa and Asia.

3:50 **Lead Remediation Using Regensis’ PetroFix**

Wm. Gordon Dean, PE, Vice President, Advanced Environmental Technologies LLC, Tallahassee

The Strickland Property/Jefferson Food Mart site in Monticello, FL, was a former automobile sales facility. Two underground storage tanks containing leaded gasoline were discovered on March 5, 1987. Groundwater contamination was subsequently confirmed and the site was accepted into the state’s Early Detection Incentive program. Lead was identified as a contaminant of concern in 2001 and lead contamination exceeding the groundwater cleanup target level has been identified in multiple wells since that time, currently exceeding the GCTL in three monitor wells. A pilot test using Regensis’ new product, PetroFix Liquid Activated Carbon, was approved by the Florida Department of Environmental Protection. A total of 240 pounds of PetroFix will be injected into six direct push technology injection points around the most contaminated well. Baseline and post-injection analytical results will be presented.

4:00 **Zero-Valent Iron Nanoparticles for In-Situ Groundwater Remediation**

Patrick Randall, PE, Vice President, Hepure, Hillsborough, NJ

This presentation will discuss our exclusive method for preparation of a Nano ZVI solution for injection, providing a solution to the most difficult issue inhibiting the widespread use of Nano ZVI. Chemically, NZVI works in the same way as micro or macroscopic ZVI placed in permeable reactive barriers. In comparison to macroscopic iron fillings, the advantage of iron nanoparticles lies in the small particle size and high specific surface area causing higher reactivity, better mobility in saturated zone, faster application and higher efficiency of decontamination process. However, the high reactivity of nanoparticles requires careful handling and processing of nZVI slurry in order to maintain its excellent properties. The degradation of nZVI—fast oxidation of zero-valent iron—is a known imperfection of the slurry products today. Unfortunately, the behavior of nZVI has not been fully understood in the past, which could lead to unsuccessful results. The current state of the technology allows the preparation and modification of nZVI slurry directly on-site just before the application, where aging behavior is now negligible. Particles of nZVI are applied in the form of aqueous suspension. Their effective concentration depends on the amount of pollutants, the chemico-physical properties of the groundwater and the geological conditions. The suspension can be applied by using an automatic dosing unit or by pumping slurry from the tank directly into the well. These application methods represent clean, simple-to-operate and environmentally friendly working processes. Due to the fact nZVI slurry is highly reactive and nanoparticles tend to age with time in water with the contribution of dissolved oxygen, it is necessary to apply freshly made suspensions of nZVI. Suspension/

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mediation projects at KSC.

Michael Goldstein, principal with The Goldstein Environmental Law Firm PA in Coral Gables, has presented at FRC for the past several years. This year, he'll be opening Day Two. His topic is "Utilizing Florida Brownfield Resources to Improve Technical and Regulatory Outcomes, Avoid Consultant Negligence Claims and Increase Company Profitability."

Each year, Goldstein provides insight into the most salient aspects of statutory, financial, policy and case history influences on Florida's brownfield enterprise.

Speed Talks and Young Professionals

sessions are back this year. These sessions are fast-paced featuring a number of shorter talks in each session.

The Speed Talk format provides vendors time to introduce new techniques and technologies. The talks may be short, but they provide high density nutrition for inquiring minds.

The Young Professionals session provides an opportunity for the under 35 crowd to take the stage. This session features eight talks covering topics from Bioremediation 101 to successfully addressing emerging contaminants of concern.

This year's regulatory session will close the conference on Friday and is typically the best-attended session of the two-

day event.

"The Annual Regulatory Session provides an opportunity to get caught up with any and all DEP waste cleanup and petroleum updates and information," noted Langenbach.

The session is formatted to allow ample time for questions from FRC attendees. The speakers kickoff the session with presentations, but often the questions give the session its character.

Joe Applegate, senior principal hydrogeologist with Geosyntec Consultants Inc. in Tallahassee, put together the session and will again serve as its moderator.

The 2019 regulatory session includes Natasha Lampkin, FCCM, FCCN, program administrator of the Petroleum Restoration Program in the Division of Waste Management at the Florida Department of Environmental Protection in Tallahassee; Graham Witt, team leader of PRP Contract Management Team 5 (Northstar) in Tallahassee; John Wright, PE, chief engineer in the DEP's PRP in Tallahassee; and Wilbur Mayorga, PE, division chief in the Environmental Monitoring and Restoration Division at Miami-Dade County.

PFAS preview

Perfluoroalkyl compounds are the emerging contaminant of concern receiving the most attention today. And they just may be the most challenging chemical class subject to remediation.

FRC first began to focus on these compounds four years ago. Since then, the number of talks on PFAS has increased.

Early this year, the U.S. Environmental Protection Agency finally promised action on PFAS contamination. Last spring, EPA Administrator Andrew Wheeler announced a program to assess human health and environmental issues related to PFAS. The plan's details are expected to be released publicly in early 2020.

The U.S. Department of Defense has started work on an extensive program to develop analytical chemistry capability and remediation technologies for military bases where perfluorooctyl compounds were used in firefighting foams. They now contaminate soil and groundwater at the bases, posing human health risks. So, it is appropriate that FRC's first technical session will focus on PFAS.

The PFAS session begins with an overview talk, "PFAS: Navigating Challenges, Best Practices and Current Affairs," presented by Karla Buechler, corporate technical director with Eurofins TestAmerica in Sacramento, CA.

Buechler's presentation "will provide an introduction to the chemistry, sources, history and regulation of PFAS and aims to provide clarity around the mountain analytical options and growing regulations," according to her abstract.

William Kerfoot, PhD, principal at Kerfoot Technologies Inc. in Mashpee, MA, a long-time FRC participant with both chemistry research and technology development on his resume, will speak next.

Per his abstract, his firm is introducing a new remediation product that has the capacity to decompose PFAS compounds in soil and groundwater to minerals of fluoride, sulfate, oxygen and carbon dioxide.

Viraj deSilva, PhD, wastewater treatment director with SCS Engineers in Tampa, will address an important aspect of PFAS water treatment—what to do with end-of-service-life activated carbon and membrane filtration media laden with PFAS removed from water. He will discuss new absorption technologies and the potential liabilities and consequences for those who use or sell PFAS compounds.

In a presentation dealing with decision-making under the uncertainty of the current monitoring and regulatory PFAS regime, Rosa Gwinn, PhD, PG, resources technology manager with AECOM in Germantown, MD, will remind attendees that the laws of physics and chemistry still apply to its behavior.

She will discuss using familiar tools to sample and measure long-chain PFAS in water and soil to help develop an efficient and effective conceptual site model.

"If we marry the eventual remedial solution (with monitoring) at sampling outset, we can similarly avoid an exhaustive sampling effort that is 'nice to have' under the status quo mind-set, and replace it with a statistically sound data set that fits hand in glove with our possible solutions to the PFAS contamination problem," she said.

An additional PFAS talk will be presented in the Young Professionals session. Kollan Spradlin's "What Does PFAS Mean to You?" is a discussion of 3M's PFAS production facility in Alabama.

As Spradlin noted, 3M invented this chemical class in the 1940s, a fact obscured by Dupont's more recent dominance of PFAS manufacturing and marketing, and not coincidentally, environmental contamination. This talk will add another dimension—a historical time line—to the PFAS discussion at this year's conference.

Conceptual site models

A second featured session, "Refining Conceptual Site Model Strategies," follows lunch on Thursday afternoon. Its six presentations cover a broad range of topics related to conceptual site model strategies.

"As a remediation engineer, the development of an accurate CSM has proven time and time again to be the key to successful remediation of contaminated sites," Langenbach said, emphasizing the broad applicability of CSM to many remediation projects and its high profile placement in this year's technical agenda.

Jim Depa, senior project manager with St. John-Mittlehauser & Associates in Chicago, will present three case studies that used significantly different data but, despite those differences, were successfully integrated into 3D high resolution models.


The technical details of his presentation will show that such modeling was able to distinguish two very different sources of petroleum contamination whose movement was influenced by the geology of the subsurface.

He noted in an interview that new tools are allowing investigators to obtain thousands of data points at a fraction of the cost of collecting actual physical soil and groundwater samples.

"But to take full advantage of this new high-resolution sampling, the resulting data needs to be visualized in 3D, statistically modeled, and produced into understandable animations," he noted.

Depa said that animated 3D models are useful tools to environmental professionals but invaluable during environmental litigation, as they can portray much more information than two-dimensional illustrations alone.

With each year of modeling, remediation project consultants have become scrupulously interested in subsurface geological features, some of which have not al-




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slurry of nZVI can be prepared on site using our dispersion units. The earlier the application of fresh manufactured material, the higher the reactivity and mobility of the nanoparticles. This technology has been used in the U.S. for several years.

4:10 Pit Bottom Emplacement of Self-Activated Persulfate to Polish Excavation Remedy

Mark Smith, Senior Field Manager, EHS Support, Tallahassee

The goal of this remedial action was to mix powdered self-activated persulfate-oxidizing agent Klozur® One into the soil-in-water slurry at the bottom of excavation pits prior to backfilling. This approach was designed to detoxify any chlorobenzenes, benzene or other VOCs remaining in water-saturated soil or groundwater within and around the excavation pits. This coupled technology remedy provided a polished removal of the pollutants remaining in soil and groundwater after the primary remediation component, excavation, was complete. Polishing is accomplished by mixing powdered persulfate into the soil-in-water slurry found in excavation pit-bottoms. Success will be measured by achieving groundwater standards for chlorobenzenes, benzene and other regulated VOCs in groundwater collected from monitoring wells MW-A2 and MW-29A for three consecutive monitoring events having a minimum interval of 90 days between sampling events. This presentation will include maps, remedy concept, photographs showing emplacement of powdered persulfate in one-ton supersacks, mixing with excavator, and backfilling, and discuss changes in groundwater concentrations after three months of persulfate emplacement.

4:20 Significant Development Improvements for Horizontal Wells That Facilitate Additional Capabilities

Wesley Wiley, PG, Senior Geologist, EN Rx Inc., Parker, CO

Well development is a critical part of the process of well installation. This is true for both vertical and horizontal wells. The development outcome can indicate characteristics about the well and the qualities of the geologic unit in which it is installed. In this presentation, we will explore the difference between the installation of vertical wells, horizontal wells and nested horizontal wells including subsequent development techniques. Documented development concerns for traditional single horizontal wells due to occlusion of the well slots and mud breakdown are addressed with a different technique for NHW installation. This technique eliminates the possibility of occlusion of the well slots and doubles the bore hole collapse, increasing performance and leading to the ability to redesign the performance of the wells screens to match different applications and to maximize open area. Several Florida sites will be used for data to compare the horizontal wells. Conclusions indicate that nested horizontal wells develop much quicker and provide more contact to the stratigraphy than traditional horizontal wells.

4:30 Real-Time Data through Horizontal Soil Sampling

Kyle Carlton, PG, Senior Geologist
Directional Technologies, Miramar Beach

Directional drilling continues to provide the environmental industry with alternatives to conventional assessment and remediation methods. Many environmental consultants may be unaware that soil sampling is possible during the directional drilling process. Collection of horizontal soil samples beneath buildings and other surface infrastructure allows for further assessment of areas inaccessible to vertical drilling methods. In addition, horizontal soil sample collection during directional drilling provides real-time data analysis that assists with determining where horizontal wells are ultimately placed. This presentation will highlight directional drilling technology for environmental sites with a focus on horizontal soil sampling. A brief case study will be presented describing implementation of horizontal soil sampling beneath an industrial facility. Further assessment and vapor mitigation were required at an industrial site due to subsurface impact from chlorinated solvents. The areas surrounding the building were previously assessed with vertical soil sampling methods. However, the soil beneath the northern portion of the building lacked appropriate assessment data due to the difficulties involved with accessing the sub-slab soil. Directional drilling with horizontal soil sampling provided additional site characterization. During directional boring advancement, soil samples were collected every five feet for plume delineation. Field analysis data were then used to determine the optimal placement for two horizontal soil vapor extraction wells.

4:40 Horizontal Directional Well Installation for Sub-Slab Vapor Mitigation

David Bardsley, PG, Vice President
Ellingson DTD, Bellefonte, PA

Indoor air quality is a substantial health and regulatory issue, and the installation of vapor mitigation systems for existing structures can be a significant challenge. Low-flow, negative pressure systems can be installed by penetrating the building floor, completing shallow vapor points and connecting the vapor points to a "whirly bird" on the building roof. This approach, although popular, is more like a band aid to the problem as remediation is not occurring. Horizontal wells are an efficient way to provide both a negative pressure barrier beneath the slab while also driving the remediation process forward by removing a meaningful amount of contaminant mass. Horizontal/directional drilling has been utilized in the environmental drilling industry for the installation of monitor and remediation systems since the late 1980s. Refinements in drilling equipment, steering/locating technology and blind well construction methods are providing consultants with a beneficial option for removing vapors from below a building slab. Challenges to successful implementation of the technology include the need for drilling and support equipment with a small footprint, the depth of the well below the building and the overall condition of the slab, foundation

structures and sub-slab utilities. Benefits of the method include allowing for safe building occupancy along with mass removal, long screen sections, little or no impact to existing building operations and flexible well head entry locations. Several recent successful sub-slab horizontal well projects will be discussed.

5:00 Day One adjourns
FRC 2019 Reception

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Concurrent Session 4B: Petroleum Cleanup Optimization

3:30 How to Estimate LNAPL Remediation Costs to Support Conditional Site Closure

Stephen Hanks, PE, Senior Engineer, Wood, Pensacola

Modification of site closure options provided in Chapter 62-780, F.A.C., allows for No Further Action with Conditions for sites that exhibit light nonaqueous phase liquid, if it can be demonstrated that the LNAPL does not present a potential risk to human health or the environment and it is not cost effective to remove. An analytical model was used to estimate the potential cost for cleaning up an LNAPL plume using the current recovery strategy as well as an alternative recovery strategy. The LNAPL Distribution and Recovery Model developed by the American Petroleum Institute was setup and calibrated using existing site data, and estimated that recovery of LNAPL would cost over \$2 million. The findings of the LDRM simulations were the basis of the NFAC proposal that was approved by the regulatory agency. Items to be discussed include LNAPL transport and distribution, regulatory framework, the development of a conceptual site model, data needs for model calibration, field data collection procedures, model calibration techniques, methods to verify model outputs, development of proposed remediation scenarios, estimation of remediation costs, and site restrictions for conditional closure.

3:45 Performance of a New Activated Carbon Amendment for Bioremediating Petroleum-Impacted Soils

Chad Northington, PE, Southeast District Manager, Regenesis, Tallahassee

The treatment of petroleum contamination using injectable activated carbon amendments is increasing in popularity, in part due to the rate with which drops in contaminant concentrations are usually seen after application. Rapid removal of contamination from groundwater by adsorption is attractive, yet in-situ biodegradation is often also needed to properly manage higher contamination levels frequently seen in petroleum sites. Here we present a new activated carbon-based amendment that combines micron-sized

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activated carbon with nitrate and sulfate salts serving as electron acceptors. Multiple field case studies will be reviewed where PetroFix was injected by low-pressure direct-push methods in areas with elevated total petroleum hydrocarbons in the diesel and gasoline range. Groundwater samples were monitored at baseline and at regular intervals post-application for standard chemical and geochemical parameters, as well as by QuantArray[®] Petro from Microbial Insights for quantification of the bacterial communities. The removal of petroleum from the groundwater by adsorption onto the activated carbon does not appear to have a negative effect on biodegradation. Additionally, the conditions in the treatment area appear to be favorable for long-term biodegradation of the remaining hydrocarbons. The results thus far indicate that PetroFix is a powerful amendment capable of treating sites contaminated with moderate amounts of petroleum hydrocarbons. The placement of activated carbon with electron acceptors under low pressure conditions ensures good amendment coverage in the high flux zones where contaminants migrate and promotes biodegradation by the microbial community in place.

4:00 Best Value for State: Identifying Non-Program Related Contamination at PRP Sites
 Donna Beares, PG, Project Manager, Gannett Fleming, Jacksonville
 PRP sites can have long histories dating back to the 1980s when petroleum discharges were discovered and reported. Discharges often involved tanks that were installed in the 1970s where there may have been multiple tank farms containing various grades of petroleum products. Over the years, a PRP site may have had many uses with the potential for subsequent discharges of petroleum products or introduction of anthropogenic compounds into soil and groundwater. Also, site lithology and regional groundwater quality may increase the background concentration of certain secondary contaminants such as iron and manganese. Therefore, it is the best value for the state to identify these compounds during the site assessment to scale remedial actions accordingly and avoid costly cleanup and/or monitoring of non-PRP contaminants. Identifying fuel additives from the original discharge may distinguish a plume from subsequent non-PRP related discharges. For example, additives such as lead and MTBE have specific production ranges and can be definitive when dating a petroleum plume. Anthropogenic influences, such as BaP and other PAHs, have potential to be mistakenly characterized as part of the original discharge. The horizontal and vertical distribution of PAHs in relation to former tank pits or other site features must be considered when evaluating the extent of the PRP-related discharge. Several case studies will be presented where subsequent releases, background concentration or other anthropogenic influences were identified during the site assessment and how this information was considered in development of a site remedial and closure strategy.

4:15 Funding the Remediation of Petroleum-Contaminated Property to Facilitate Redevelopment
 Scott Graf, PG, Principal/Env. Department Manager, Terracon, Tampa
 Terracon was selected by developer HRI to provide environmental and geotechnical consulting services for a 1.03-acre parking lot located across from City Hall in downtown Tampa, purchased for \$7.5M. The proposed redevelopment included a \$100 million, 17-story hotel with a parking garage and retail

shops. The redevelopment was complicated by impacts from two separate historic on-site petroleum storage facilities. Concurrent with on-going site assessment activities, the Florida Department of Environmental Protection started the Advance Cleanup for Redevelopment program to encourage expedited cleanup associated with development of petroleum-contaminated sites. Terracon, on behalf of HRI and the city of Tampa, submitted ACR applications and funding was approved for \$1 million of the total estimated \$2.3 million cleanup cost. Remedial activities conducted at the site included the removal of eight underground storage tanks, source removal of 9,300 tons of petroleum-contaminated soil requiring dewatering and sheet piling, solid chemical oxidizer mixed with backfill to address residual petroleum impacts, and application of an in-situ chemical oxidizer via direct-push injection in areas that were not accessible to excavate. Source removal and backfill activities were completed prior to the groundbreaking ceremony in February 2019. In addition to funds from the ACR program, the city of Tampa entered into a Brownfield Site Rehabilitation Agreement and received approval for a \$500,000 Voluntary Cleanup Tax Credit application for work completed in 2018.

4:30 Integrating Multi-Technology Surfactant-Enhanced Bioremediation and Oxidation Approaches for Treatment of Petroleum Hydrocarbons
 Dan Socci, Chief Executive Officer, EthicalChem, South Windsor, CT
 A major limiting factor in remediation of hydrocarbon contaminants is their relatively low solubility in water. Enhancing the solubility of contaminants by use of surfactants can significantly improve the efficiency of bioremediation, free product removal and chemical oxidation treatment approaches. Combined application of surfactant and nutrients at sites with petroleum impacts can greatly enhance bioremediation of petroleum hydrocarbons. Surfactants desorb and emulsify the tightly sorbed, hydrophobic contamination from soil into the aqueous phase while the nutrients facilitate the stimulation and proliferation of micro-organisms that will degrade hydrocarbon contamination. To enhance contaminant removal using a combined surfactant and low concentration hydrogen peroxide solution, reduction in viscosity, loosening of the NAPL and buoyancy are achieved to facilitate contaminant removal via extraction. For chemical oxidation applications, a combined oxidant-surfactant solution, the delivery of contaminants to oxidants in the aqueous phase can be optimized via contaminant desorption and emulsification by the surfactants. Liberation of the sorbed hydrophobic contaminants and emulsification into the aqueous phase as small particles significantly increase surface area available for reactions with oxidants, improves soil and groundwater remediation effectiveness. This presentation will discuss field implementation of multiple surfactant-enhanced technologies that include Surfactant Enhanced Bioremediation, the patented SEPR[™], Surfactant Enhanced Product Recovery, and S-ISCO[®], Surfactant-enhanced In Situ Chemical Oxidation, technologies integrated to implement an innovative treatment approach for remediating subsurface petroleum impacts at an active gas station. Field implementation of sequenced applications of SEPR and S-ISCO at a creosote site will also be discussed. This presentation will draw upon independent research by the University of Madrid highlighting the benefit of a combined surfactant-oxidant and optimized surfactant selection approach for remediation.

4:45 In-Situ LNAPL Treatment Following Pipeline Transmission Rupture
 William Brab, CPG, PG, Senior Geologist, AST Environmental Inc., Midway, KY
 Failure of a 16-inch stopple fitting at a petroleum pipeline transmission meter station in Michigan resulted in the release of approximately 1,700 barrels of gasoline fuel in June 2000. Approximately 1,400 barrels of fuel were recovered using vacuum trucks, booms and underlain dams. Approximately 30,000 tons of impacted soil were removed to approximately four feet where accessible. Free product recovery via groundwater extraction capable of up to 25,000 gallons per month and long-term groundwater monitoring was conducted at the facility following the release. The groundwater extraction system was shut down in 2012. Due to access issues and compatibility concerns with multiple buried pipelines through the area of remediation, an innovative technology was required that could be implemented within the constraints present. BOS 200[®] was selected as the remedial technology. The selected option had to remove LNAPL and provide significant reductions in total sorbed and dissolved phase mass, control further plume migration beyond the area of treatment and be implemented without compromising the integrity of the buried petroleum transmission lines. Additional characterization was conducted in September 2013 to further quantify and define the vertical and horizontal extent of total mass at the facility. It was determined that two injection events of BOS 200 would be required to accomplish the site cleanup goals. Measurable LNAPL was present in numerous soil borings/monitoring points completed during the characterization, and VOC and TVPH concentrations in soil exceed C_{SAT} threshold guidelines. The initial injection was performed in April 2014. The second injection event was completed in April 2016. One year following the completion of the first injection event, resampling of soil and groundwater was performed to determine mass removal and reestablish the baseline for the second injection event. Total sorbed mass removal estimates across the treatment area averaged approximately 85 percent and 65 percent for benzene and Total Volatile Petroleum Hydrocarbons, respectively. Dissolved phase mass removal estimates averaged approximately 85 percent and 65 percent for benzene and TVPH, respectively. Performance groundwater monitoring has continued quarterly since completion. Results as of the December 2018 groundwater monitoring event indicate average benzene removal at 82 percent and TVPH at 92 percent when compared to pre-injection analytical data. The occurrence of LNAPL is now sporadic and isolated to an occasional sheen in two monitoring wells within the source area compared to year-round persistence with measurable thickness in five monitoring wells prior to treatment. This talk will emphasize that remediation is only effective if there is an accurate conceptual site model; infrastructure dictates the investigative and remedial objectives and efforts; remediation of total contaminant mass is not confined within regulatory cleanup standards; and remediation technology and implementation is dynamic—there is no “one-size-fits-all” approach for every site.

5:00 Day One adjourns
 FRC 2019 Reception *Sponsored by Vertebrae Well Systems*

Day Two, Friday, Nov. 8, 2019

Opening Session

8:30 Utilizing Florida Brownfield Resources to Improve Technical and Regulatory Outcomes, Avoid Consultant Negligence Claims and Increase Company Profitability
 Michael Goldstein, Principal, The Goldstein Environmental Law Firm PA, Coral Gables

Session 5: Young Professionals

8:50 The Metabolic Miracle: A Bioremediation Refresher
 Anthony Giannetti, Client Services Manager, Cascade, Philadelphia, PA
 Bioremediation is among the most common in-situ treatment remedies for sites contaminated with organic compounds, particularly petroleum hydrocarbons and chlorinated solvents. Harnessing or supplementing the power of natural microbial degradation is a flexible, low-cost, sustainable and effective method of treatment for a range of contaminants. Because of the well-established track record of the technology, practitioners in the environmental industry often implement the treatment without completely understanding the process. There is an assumed level of knowledge about how and why injection of cultures, nutrients and food sources produce laboratory analytical data indicating a decreased concentration of contaminants. But what is really happening in the stages between injection and sampling? What are those microbes doing to the contaminants? We'll explore the driving forces behind the biogeochemical metabolic processes and provide insight into electron acceptor pathways and cometabolism. To support application of this new knowledge, we'll touch on how the basic processes inform our selection of the specific conditions and parameters that can be monitored and manipulated to produce optimal remediation performance.

9:00 Expedited Site Rehabilitation of TRPH-Impacted Soils
 Davis Lofton, PhD, EIT, AMASCE, Sr. Staff Engineer, Geosyntec Consultants Inc., Houston, TX
 During closure of a facility located in the Florida Panhandle, total recoverable petroleum hydrocarbon

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concentrations were detected above applicable soil cleanup target levels. Due to contractual requirements, environmental impacts needed to be remediated within 12 months to allow for site redevelopment. Geosyntec was retained to perform site assessment activities, prepare a site assessment report, negotiate assessment and cleanup requirements with the Florida Department of Environmental Protection, and oversee remedial action implementation and documentation. Environmental site assessment activities included soil and groundwater sampling. Soil sampling results delineated an approximate 1,700-square-foot area with TRPH fraction concentrations above applicable SCTLs to a maximum depth of four feet below land surface. Groundwater sampling results indicated TRPH concentrations were less than the residential groundwater cleanup target level. Since groundwater was not contaminated, sampling of an adjacent stream was not necessary. After meeting with DEP to discuss the findings and remedial options, a site assessment report documenting site assessment activities and requesting no further action for site groundwater was submitted to DEP. Following DEP approval of the SAR, a request for proposal that included an excavation design was prepared. Since dewatering was not necessary, a remedial action approval order was not required. The excavation was performed and approximately 468 tons of soil were excavated and disposed at a Class I landfill. A source removal report documenting the excavation and confirmation soil sampling was submitted. DEP issued a site rehabilitation completion order about one year after initiating assessment activities.

9:10 **ASCTLs, and Innovative Soil Management and Remediation Techniques in Golf Course Redevelopment**

Sanaul Khan, Staff Professional, SCS Engineers, Boca Raton

SCS Engineers assessed and is remediating approximately 66 acres of land located in Delray Beach, FL, formerly operated as a golf course and historically used as agricultural land. Due to the historic application of legally applied pesticides, herbicides and fertilizers used in the maintenance of crops and golf course features, remnants of arsenic and pesticides required soil management efforts during site redevelopment into an age-restricted (55 years and over) community. Based on residential age usage, SCS presented and was subsequently approved by the Florida Department of Environmental Protection to apply alternative soil cleanup target levels of 8.6 mg/kg and 4.4 mg/kg for arsenic across the site. To achieve the ASCTLs, soil blending techniques are being implemented to blend down residual surficial soil concentrations commonly affected by historical applications. Prior to redevelopment, SCS conducted several pilot test studies to demonstrate that proposed soil blending techniques would effectively reduce arsenic concentrations below the applicable ASCTLs. The site is proposed for restriction via non-conventional means whereas lasting Homeowner Association care will prevent residents from handling or maintaining soil and standard groundwater restrictions will prevent the usage of groundwater for personal use. Specific site development characteristics such as creation of deep, boundary surrounding lakes will limit further impacted groundwater migration to site boundaries. The integration of GIS and Trimble technologies for this type of redevelopment has allowed SCS to assess, track and manage site soils more accurately and efficiently.

9:20 **One Man's Wastewater is Another Man's Treasure: Water Reuse Options for a Hydraulic Control System**

Jaclyn Vu, PE, Environmental Engineer, JEA, Jacksonville

Alexis Johnson, Senior Staff Engineer, Geosyntec Consultants Inc., Jacksonville

The JEA Northside Generating Station in Jacksonville, FL, provides electricity for the city of Jacksonville and portions of three adjacent counties. The facility was constructed in the mid-1960s and borders tributaries of the St. Johns River and a tidal marsh within the Timucuan National Ecological and Historic Preserve. The NGS is under a Resource Conservation and Recovery Act consent order where the corrective action objective for groundwater is the attainment of groundwater and surface water cleanup target levels for arsenic, nickel and vanadium at the downgradient property boundary. Hydraulic control of impacted groundwater along the perimeter of the site was implemented using five vertical groundwater extraction wells strategically placed to mitigate off-site discharge of metals exceeding the GCTLs and SWCTLs. Typical groundwater recovery systems result in large volume waste streams with high disposal costs. But Geosyntec collaborated with JEA on an innovative approach for the reuse of extracted groundwater as part of their plant operations. The NGS hydraulic control system was constructed to allow diversion of extracted groundwater prior to off-site disposal without interruption to control system operation or installation of significant additional infrastructure. At design flow rates, water reuse could provide up to approximately 11,000 gallons per day of supplemental process water for the facility and decrease discharge to JEA's publicly owned treatment works by the same volume, providing a more sustainable, closed-loop system and reducing overall project costs by up to \$218,000 per year.

9:30 **CVOC Contaminated Zone Remediation with the use of Zero Valent Iron and Bentonite**

Peter Moretuzzo, PE, Project Manager, Geo-Solutions, St. Petersburg

The project at a former dry-cleaning facility was completed outside the state of Florida and included in-situ chemical reduction of chlorinated volatile organic compound contaminated soils. The rotary soil mixing was completed using a Delmag RH28 drill rig fitted with a nine-foot diameter auger to mix zero-valent iron and bentonite with the site soils. The RSM was completed from five feet to 45 feet below an average existing ground surface. The target volume of contaminated soil treated was 9,037 cubic yards, however, a total of 10,304 cubic yards were mixed in order to provide complete coverage of the target zone. In total, the 10,304 cubic yards of soil were mixed with 277,400 pounds of bentonite and 369,000 pounds of ZVI, which equates to an overall bentonite addition of 1.05 percent by dry weight of soil and an overall ZVI addition of 1.40 percent by dry weight of soil using an assumed dry soil density of 95 pounds per cubic foot. For quality control testing, wet samples of the freshly mixed soil/bentonite were collected immediately after column completion at a frequency of one sample for every 500 cubic yards of mixing completed with a minimum of one sample each day of mixing. The samples were spaced out within the treatment area with the hope of providing a good representation of the entire treatment area. These samples were collected using an in-situ sampler that attaches to the drill rig auger. The grab samples were separated for QC analytical and magnetic separation testing to ensure the target ZVI addition was met.

9:40 **What Does PFAS mean to You?**

Kollan Spradlin, PE, CHMM

SCS Engineers, Tampa

Perhaps you have heard about expectations for new regulations on chemicals of concern. Or maybe you have heard that PFAS remediation is going to be the next big industry focus. This presentation will be a short technical overview of what PFAS is, a brief history of PFAS and a look into a 3M PFAS production facility in Alabama. Perfluoroalkyl substances are a family of chemicals originally licensed by 3M in the 1940s and used by Dupont and other manufacturers to produce products such as Teflon, fire-fighting foam, wire

insulation and liquid-resistant textiles used in waterproof clothing. Increased usage, as well as an advancement in laboratory detection technologies, led to a surge in the documented presence of the PFAS chemicals in the environment in the early 2000s. The ability to document the presence of the chemicals has led to a more thorough understanding of the human health and environmental risks associated with the chemical products in recent years. As these chemicals become more stringently regulated, consultants, industry partners and regulators face increased pressure to manage previous releases and mitigate future human exposure to PFAS chemicals.

9:50 **Implementing Bioremediation to Address Trichloroethene Source Zones at a Legacy Hydraulic Containment Site**


James Mills, MS, Senior Staff Professional, Geosyntec Consultants Inc., Tampa

Historical trichloroethene releases resulted in the contamination of the surficial aquifer at the Precision Fabricating & Cleaning Co., or PFC, site in Cocoa, FL. Site assessment investigations revealed the presence of onsite source areas and an associated downgradient dissolved plume that migrated offsite. In 2002, a hydraulic containment system was implemented to provide flux control at the PFC property line in conjunction

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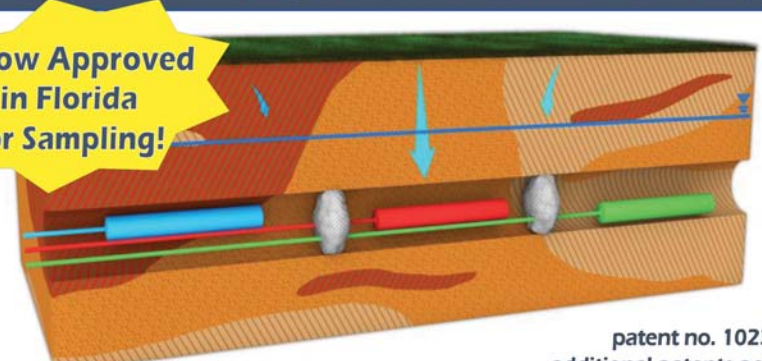


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with natural attenuation monitoring of the downgradient dissolved plume offsite. An enhanced in-situ bioremediation strategy was implemented in 2015 that included bioaugmentation and biostimulation with the remedial objectives of reducing onsite TCE source zone concentrations in a limited and known area, and facilitating the proposed shutdown of the hydraulic containment system. The success of the 2015 limited EISB event in effectively promoting reductive dechlorination in a known source zone (the combined remedy approach was presented at the 2016 Florida Remediation Conference) led to the design and implementation of a subsequent EISB event conducted in May 2019. The remedial objectives of the May 2019 event were to reduce TCE concentrations in known and suspected source zones onsite and targeted zones offsite with elevated concentrations above groundwater cleanup target levels and facilitate the shutdown of the hydraulic containment system. The May 2019 EISB event included bioaugmentation with the KB-1® dechlorinating anaerobic microbial culture from SIREM Laboratory, and biostimulation with the SRS®-FRL slow release emulsified vegetable oil electron donor from Terra Systems Inc. KB-1 and SRS-FRL were injected at multiple discrete intervals through temporary direct push technology injection points. Prior to the injection event, the hydraulic containment system was shutdown with regulatory approval. The shutdown marked approximately 17 years of operation in which the objective of hydraulic containment was achieved, yet mass removal was asymptotic and additional remedial measures were warranted to reduce

source area concentrations and meet site cleanup objectives. The shutdown reached another important milestone in transitioning from active hydraulic containment to passive long-term monitoring at the site. This presentation will provide up-to-date performance monitoring results associated with the remedial design implementation. Additionally, the presentation will include strategies, lessons learned and considerations for bioremediation implementation and remedy optimization.

10:00 Designing Away Common In-Situ Bioremediation Complications

Lydia Ross, MS, PE, Technical Support Engineer, EOS Remediation, Research Triangle Park, NC
Emulsified vegetable oil has been injected at thousands of sites over the past decade to treat chlorinated solvents, chromium, uranium, nitrate, perchlorate, explosives and other contaminants. These systems can provide very high levels of treatment, however, all in-situ remediation technologies invite a host of complications depending on the complexities of each site. With technical expertise and available design tools, you can “design away” many of the common possible complications with using EVO for in-situ source or barrier remediation. This presentation will cover preemptive measures to ensure remediation success using available design tools and many years of field experience. Best practices and specific examples from Southeast regional sites will be shared to demonstrate how good design can accommodate adjusting pH in acidic aquifers, avoiding injection well fouling, improving contact efficiency and optimizing well spacing for reducing total project cost. Additional topics to be covered include assessment data that can be collected prior to design, the formulas and equations from existing ESTCP and EOS Remediation LLC design tools that can be utilized to calculate EVO and amendment quantities and specific injection protocols that can be followed in the field to maximize distribution and minimize potential for well fouling. Where available, local Florida case studies will be presented to illustrate lessons learned.

Break: 10:10 - 10:30

Concurrent Session 6A: Remediation and Modeling Case Studies

10:30 ERH Remediation in Interstate Median

Chris Blundy, Senior Project Manager, TRS Group, Longview WA
A tanker truck overturned in 2014, releasing approximately 1,200 gallons of trichloroethylene into an interstate median, between the east and west bound travel lanes. Contaminated surface soil from the area was excavated a few feet below ground surface. The median is only 60 feet wide and has steep slopes towards the center drainage ditch that restricted the potential depth of excavation in order to maintain the integrity of interstate lanes. In subsequent investigations, TCE impacts were detected to a depth of almost 40 feet below ground surface. The soil consisted predominantly of a very tight clay with minor lenses of silty clay underlain by a drinking water aquifer. The maximum concentration of TCE in soil was 1,100 mg/kg, which was identified at 32-33 feet bgs. The total, potential mass of TCE was estimated at 14,500 pounds based on a maximum of 1,200 gallons of TCE. The remediation goal was established at 0.073 mg/kg TCE in soil, which is the state’s risk-based screening standard for soil protective of groundwater. Alternative remedial technologies were evaluated and electrical resistance heating was selected. Injection in tight clays was believed to be technically impracticable and further soil removal would have resulted in significant risk to the structural integrity of the interstate. ERH minimized risks and had the ability to treat both saturated and unsaturated soils and remove TCE in low permeability soils. The proposed ERH remediation zone within the median was 6,015 square feet. The treatment depth ranged from 0 to 40 feet bgs, resulting in a treatment volume of approx. 8,100 cubic yards. Thirty-nine electrodes with co-located vapor recovery screens were installed to a maximum depth of 42 feet bgs. An additional 20 independent vapor recovery wells and six temperature monitoring points were also installed within the remediation zone. An impermeable liner was installed over the remediation zone at the surface. A vapor/liquid treatment system was installed north of the interstate. Treatment system power cables, vacuum piping and other equipment was installed under the interstate to connect the equipment in the remediation zone with the treatment system. The electrodes were energized to heat the soil, while a vacuum was established in the remediation zone to extract vapors to the treatment system. Removed TCE vapor was captured on vapor-phase granular activated carbon. The ERH system operated for 281 days, inputting 2,134,090 kWh of energy to achieve the treatment goal of 0.073 mg/kg TCE. The ERH remediation applied 121 percent of the estimated energy to achieve the cleanup objective. Based upon PID analysis of soil vapors recovered during ERH operations, approximately 8,638 pounds of TCE was removed from the treatment volume during the remediation. The system heated the soils within the treatment volume to design temperatures that effectively removed CVOCs from the subsurface for capture and treatment. Throughout the project, site and public safety were maintained while minimizing hazards associated with operations on an interstate highway. The results demonstrate that ERH remediation can achieve aggressive remediation goals in tight clay, in a challenging location in a relatively short time frame.

10:45 Leveraging Warm Water from Source Area Thermal Remedy for Combined Biotic/Abiotic Degradation of CVOCs

Dan Bryant, PhD, PG, Director, Woodard & Curran, East Windsor, NJ
We sought to enhance remediation of a concentrated chlorinated VOC plume downgradient from a source undergoing thermal remediation by leveraging the warm water migrating from the thermal treatment area. The warm water was expected to increase microbial activity and abiotic degradation reaction rates, release organic carbon and increase desorption of CVOCs. We utilized Provect-IR, a reagent that couples

biotic and abiotic remedies—a solid, fermentable carbon source to stimulate anaerobic biodegradation—with zero-valent iron for chemical reduction. The abiotic ZVI reactions will ensure continued treatment if groundwater became too warm and inhibited microbial activity. The thermal remedy was operated from December 2017 to July 2018. Two reactive treatment zones were constructed immediately downgradient of the thermal area by injecting 148,500 pounds of Provect-IR into 325 discrete intervals among 57 boring locations in February and April 2018. Injection targeted a transmissive sand zone approximately 16 to 50 feet below grade. Performance was tracked by monitoring groundwater temperature, microbiological activity and analysis of CVOCs and redox-sensitive groundwater parameters. One year after shutdown, temperature has increased over 25°C in portions of the downgradient plume and have started to plateau. Groundwater samples collected one and two months after injection but before thermal shutdown, and four and seven months after injection, after thermal shutdown, show groundwater is strongly reducing and microbial activity remains high. TCE and cis-DCE concentrations are reduced two to four orders of magnitude in the upgradient treatment zone and in the deep interval in the downgradient treatment zone. In the downgradient shallow zone, TCE concentration is reduced by 50 percent but cis-DCE has increased nearly three times. This is attributed to less effective reagent distribution, but degradation is occurring. Temperature and groundwater

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ways been easy to characterize.

David Harro, PG, director of geological services at the G3 Group in Odessa, will describe a multi-electrode resistivity implant technique, MERIT, that relies on permeant implanted resistivity electrodes to image the throat of sinkholes.

A sinkhole's throat can be an important location for connecting waters from surficial aquifers to the deeper waters of the Floridan Aquifer. Accurate characterization of sinkhole throats substantially improves CSM, Harro will explain.

How many times does a data set of samples taken from an array of monitoring wells show one or two anomalous high values, while the rest are consistent, often near or below limits of detection, baffling conventional explanation.

In their presentation, "Changing the Perspective on 30 Years of Granularity with HRC," Robert Schatzman, PG, senior project manager at L.S. Sims and Associates Inc. in Rockledge, and Lance Robinson, PE, chief technology officer at EN Rx Inc. in Parrish, will discuss the new perspective on monitoring wells and the use of the Vertebrae™ well system.

"Use of Vertebrae's multipurpose segmented horizontal wells can drastically improve conceptual site models and facilitate faster remediation," said Schatzman. "This is accomplished by Vertebrae orientation allowing the maximum amount of surface area contact within impacted areas, thus increasing the precision of data and the effectiveness of treatment," said Schatzman.

"Recently, this method of installation has yielded additional exciting benefits that relate to development and well performance," said Robinson. "Our presentation will illustrate several of the key fascinating benefits."

Vapor intrusion, the movement of chemicals as vapor through soils and sometimes into buildings, is driven by a different set of physicochemical forces than the more familiar ones that drive solute movement in solution.

In his presentation, Jim Fineis, PG, president of Total Vapor Solutions in Alpharetta, GA, will discuss a consistent and systematic approach for determining the proper number of samples to take and how to incorporate other considerations such as biodegradation that may influence vapor persistence and concentration.

In their talk, Nick Barnes, PE, project engineer, and Zeke He, PhD, PE, environmental engineer, both with HSW Engineering Inc. in Florida, will shed light on the effect that chemical speciation has on remediation projects, focusing on chromium, cyanide and other chemical speciation.

Understanding chemical speciation has a payoff, Barnes noted.

"Chemical speciation data can provide valuable information as it relates to chemical fate and transport (solubility, mobility, reactivity, bioavailability, etc.) and toxicity endpoints," Barnes said. "This information can be used to implement cost-effective site assessments and risk-based site exit strategies."

Rounding out the CSM session, Joshua Richards, PG, CHMM, program manager at Pace Analytical Services LLC in Indianapolis, IN, will discuss how remediation projects can be significantly assisted using compound specific isotope analysis.

Where multiple chemicals, for example chlorinated organic compounds, are found at a site, CSIA can contribute significantly to a conceptual site model if it helps distinguish sources of different chemicals, or an individual chemical of interest from others of similar elemental content.

Richards will provide the details in his talk about evaluating a complex site for source determination.

FRC has included at least one CSIA-focused presentation for the last few years. This method's data have led to a clear understanding of the source of specific chlorinated compounds at a site with multiple sources or multiple different chlorinated compounds.

The findings were not the result of alchemy, but they were similarly amazing and extremely useful.

FRC has not focused much attention on surface water remediation in the past, but one abstract caught the attention of the selection committee.

Thomas Waite, PhD, PE, founder and president of Ferrate Solutions Inc. in Melbourne, will describe use of ferrate, specifically FeO_4^{2-} , to remove bacteria, particulates and nutrients from surface water.

"When you mix algae, nutrients and sediment, you have the makings of a very sick lake! Ferrate is an inexpensive, reliable solution for remediation and we're glad that it is finally available," Waite said. "New technology to the rescue!"

This talk may be important as a herald of a new focus on environmental stewardship of human-mediated eutrophic surface water as "remediation" rather than "treatment." The distinction between the two terms is not simply rhetorical. Remediation implies a directed permanent improvement rather than episodic responses to eutrophication.

This is one of the first FRC talks to specifically address surface water quality in terms of remediation. Perhaps surface water remediation, or at least some of the efforts and technologies, will soon be viewed as remediation rather than a short-term adjustment, as treatment implies.

Over 100 exhibitors

The exhibit hall is the place for the best chats about remediation technology and services. Over 100 companies have reserved both space at FRC 2019.

The number of exhibitors at FRC has grown considerably over the past several years and it's now the largest exhibit of its kind in the Southeast U.S. and one of the largest in the country. It's an integral part of FRC and a good opportunity for face time with industry colleagues.

Charity event

The FRC Charity Golf Tournament, celebrating in its 10th year, will be conducted on Wed., Nov. 6, at the ChampionsGate Golf Club's International Course, a short walk from the Omni's Osceola County Conference Center, site of the conference.

This event benefits a different charity children. This year, the FRC charity committee selected The Gift of Swimming as its charity.

The Gift of Swimming provides swimming instruction to infants and children focused on drowning preventing and survival skills in water. The organization provides training regardless of ability to pay and without any discrimination, such as excluding the physically handicapped who are welcomed to the program.

Jennifer Belmore, vice president of Carbon Service and Equipment Co. Inc.

in Orlando and co-chair of the FRC charity committee, suggested this organization to the committee's members.

"Our days are so busy, day in and day out," she said. "This event gives us an opportunity to give back to others, and to take time for something that's not about ourselves and our work."

In the nine years since the charity event began, the conference has donated well over \$200,000 to the nine different Florida charities to further their missions.

In addition to fund-raising activities at the golf course on the day before FRC, the conference itself will be more active this year with fund-raising.

A silent auction will be conducted during the first day and a half of the conference in the exhibit hall, and a drawing will be held for the FRC "drum of cheer," a 55-gallon drum filled with adult beverages of every kind and size.

The auction is a great place to pick up those unusual holiday gifts. And tickets will be sold during the conference that provide buyers with a shot at taking home the drum and all its contents. The hope is to raise a record-level donation for The Gift of Swimming this year.

Complete information about the conference and the charity event is online at www.enviro-net.com/frc.



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Trump administration proposes ESA rollbacks; environmental advocates immediately file suit

By BLANCHE HARDY, PG

In August, Earthjustice filed suit against U.S. Department of the Interior Secretary David Bernhardt, the U.S. Fish and Wildlife Service, U.S. Secretary of Commerce Wilbur Ross and the National Marine Fisheries Service in U.S. District Court for the Northern District of California.

Case No. 3:19-cv-05206 is a complaint for declaratory and injunctive relief related to proposed Trump administration regulations weakening the federal Endangered Species Act.

Earthjustice filed suit on the behalf of the Center for Biological Diversity, Defenders of Wildlife, the Sierra Club, Natural Resources Defense Council, National Parks Conservation Association, WildEarth Guardians and the Humane Society of the U.S.

Just days earlier, the Trump administration proposed changes to the ESA. The changes purportedly had species recovery as their ultimate goal and were touted by officials as “improvements” to the act.

The changes apply to ESA Section 4 and Section 7.

Section 4 covers determination of whether a species is endangered or threat-

ened, changes to those designations, impact to species range and the designation of critical habitat as well as other criteria.

Section 7 covers consultations with other federal agencies where impact to species listed under Section 4 may occur.

The ESA applies significant protections to both endangered and threatened species. These protections also include controls on the habitats occupied by, or likely occupied by, the listed species.

The new regulations would significantly weaken protections for endangered and threatened species and their habitat. The protection of threatened and newly listed species would no longer be automatic, nor would critical habitat automatically be protected, possibly even if it is persistently occupied by a listed species.

Further, the change opened the door to inserting cost-benefit analysis into the decision-making process that determines whether species are listed as threatened or endangered, and reducing consultation standards and science-based analyses ensuring federal agencies avoid placing a species’ survival at risk.

While cost-benefit analysis was promoted, the changes prevent introducing the

results of climate change and sea level rise on the species and their habitat.

The plaintiffs are seeking an order declaring the revised ESA regulations invalid, vacating the revised ESA regulations, enjoining reliance on the revised ESA regulations and reinstating the prior ESA regulations.

The lawsuit addressed three regulatory change packages each attacking critical provisions of the ESA including, as stated in the filing, “repealing the longstanding FWS regulation implementing ESA Section 4(d) that automatically extended certain protections to threatened animals and plants upon listing; one amending other parts of ESA Section 4 regulations jointly promulgated by FWS and NMFS that govern listing, delisting, and designation of critical habitat; and one revising FWS and NMFS regulations governing ESA Section 7 consultations in these regulatory revisions.”

The lawsuit, noted that the regulatory changes to the ESA “failed to consider and disclose the significant environmental impacts from these regulations in violation of the National Environmental Policy Act. The final regulatory revisions are major

federal actions, none qualify for categorical exclusions from NEPA compliance, and each will affect the human environment by undermining the ESA’s purpose and protections.”

Trump administration officials claimed they have acted to increase clarity and encourage transparency, wrote Earthjustice attorneys, but, to the contrary, “the regulatory revisions weaken and violate the requirements of the ESA.”

The modifications to the ESA were overseen by U.S. Department of the Interior Secretary David Bernhardt, a former lobbyist for oil and gas companies, and industrial agriculture interests.

National Resources Defense Council attorneys noted that Bernhardt has worked for years to weaken safeguards on wildlife, air quality and marine ecosystems.

“His resume includes attacks on salmon protections in California, blocking limits on air pollution from coal-fired power plants, tapping an aquifer beneath the Mojave Desert for commercial use, and allowing toxic waste disposal in national forestlands,” wrote Rhea Suh, former NRDC president, in an op-ed.

Contrary to the Trump administration’s disdain for the ESA, it is quite popular with the public. Four in five Americans support the ESA, according to Ohio State University. Over 800,000 people sent comments to the federal government opposing the Bernhardt changes.

“The public overwhelmingly supports the ESA, which has succeeded in saving humpback whales, bald eagles and more than 99 percent of listed species from the brink of extinction,” said Nicholas Arrivo, staff attorney for the Humane Society of the U.S. “This package of regulatory changes prioritizes industry profits over the very existence of imperiled species.”

The Trump administration is expected to face a flurry of legal challenges over its attempt to rollback ESA protections.

Partnership seeks solutions to climate change impacts

By BLANCHE HARDY, PG

To address the impacts resulting from climate change, the Community Foundation of Collier County, the Southwest Florida Community Foundation, Florida Gulf Coast University and the Conservancy of Southwest Florida recently entered into a three-year partnership to align community resources in a regional climate change management effort.

The group, Growing Climate Solutions – Path to Positive Southwest Florida, plans to establish a coalition of residents representing key community sectors including health, education, faith, business and the environment.

Their goal is to engage stakeholders in educational and awareness-building endeavors, and to introduce research and information leading to local climate solutions that will help sustain their communities.

“The partnership is an outgrowth of the climate change survey results released (earlier this year),” said Eileen Connolly-Keesler, president and CEO of the Community Foundation of Collier County. “The results were very clear. Southwest Florida residents believe now is the time to take action on this issue. Collective action means we are more powerful when we work together—within and across sectors.”

The group is working with national climate change organization EcoAmerica who assumed an advisory role in the coalition’s development of education and outreach programs.

The Kapnick Foundation also assisted the group in initiating the program by providing funding through a leadership gift.

“We know positive change starts locally, making a Southwest Florida-focused

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Long-term monitoring shows nitrogen enrichment—not temperature—to be key driver of coral reef decline at Looe Key

By BRIAN LAPOINTE, PHD

Coral reefs have evolved over hundreds of millions of years and are now considered one of the most threatened ecosystems on our planet. These biologically diverse ecosystems have been in decline globally since the 1970s due to a growing number of recognized stressors.

In the Caribbean basin, an estimated 40 percent of coral has been lost over the last 40 years and similar losses have been observed along the Great Barrier Reef in Australia.

Scientists attribute coral bleaching and ultimately massive coral death to a number of environmental stressors, in particular, warming water temperatures and increasing coral diseases related to climate change. However, based on 30 years of unique data from Looe Key reef in the lower Florida Keys, the problem of coral bleaching and diseases is not just due to a warming planet, but also a planet that is simultaneously being enriched with reactive nitrogen.

The study, entitled “Nitrogen enrichment, altered stoichiometry, and coral reef decline at Looe Key, Florida Keys, USA: A three-decade study” was recently published in the international journal *Marine Biology* and has attracted widespread media attention.

The study’s co-authors include Rachel Brewton and Laura W. Herren of FAU’s Harbor Branch Oceanographic Institute; James W. Porter, PhD, emeritus professor of ecology at the University of Georgia; and Chuanmin Hu, PhD, of the College of Marine Science at the University of South Florida.

The study was picked up by more than 300 media outlets worldwide including NBC Nightly News, *Newsweek*, NPR National, *Livescience*, *Miami Herald*, *Tampa Bay Times* and *Daily Mail Online*, among others. The potential audience reach was more than 463 million people around the world.

The study involved the collection of seawater samples in the Looe Key Sanctuary Protection Area (SPA) from 1984 to 2014 during both wet and dry seasons for analysis of dissolved inorganic nitrogen (DIN, ammonium and nitrate), soluble reactive phosphorus (SRP), and chlorophyll *a* (phytoplankton biomass).

Abundant macroalgae samples were also collected at Looe Key SPA during the study for analysis of carbon:nitrogen:phosphorus (C:N:P) ratios to assess shifts in nutrient stoichiometry over the long-term study.

Porter quantified the living coral cover, bleaching and diseases at Looe Key over the period of study to identify how the annual rate of coral stress and die-off related to changes in nutrients, chlorophyll *a* and temperature.

Hu analyzed Landsat and MODIS satellite imagery to better understand how increasing freshwater discharges from the Everglades and “black water” events affected salinity, colored dissolved organic matter, nutrients, chlorophyll *a* and turbidity in shallow waters between Florida Bay and the Florida Keys National Marine Sanctuary (FKNMS).

The results showed that both DIN and chlorophyll *a* more than doubled at Looe Key SPA during the 30-year study. The increased DIN and chlorophyll *a* correlated closely with periods of heavy rainfall and increased water deliveries to the Everglades, especially between 1991 and 1995 when FKNMS officials requested increased freshwater flows to reduce salinity in Florida Bay.

These increased flows resulted in expansive cyanobacterial blooms in Florida Bay that were carried by tidal currents into the waters of the FKNMS.

A key finding from the study is that stormwater runoff from urbanized areas of the Florida Keys and the Everglades basin, which extends north to Orlando, have very high DIN:SRP ratios, up to 260:1. These discharges drive algal blooms to a high degree of phosphorus limitation and scavenge seawater SRP concentrations to low concentrations in the Looe Key SPA.

The macroalgae tissue data showed significant increases in the mean N:P ratios from 27:1 in the 1980s to 71:1 between 2010 and 2014, showing a clear trend towards increasing SRP limitation.

Controlled laboratory studies have shown how the combination of increased DIN and low SRP concentrations cause metabolic stress and eventually starvation in corals.

Porter’s data revealed that living coral cover at Looe Key SPA declined from nearly 33 percent in 1984 to less than six percent in 2008. The annual rate of coral loss varied from two percent per year to eight percent per year during the study, with the highest rates between 1985 and 1987 and from 1996 to 1999 following periods of heavy rainfall and increased runoff from the Everglades.

The increased runoff resulted in DIN enrichment and spikes in the DIN:SRP ratio at Looe Key SPA. Between 1991 and 1995, increased freshwater deliveries to the

Everglades and heavy rainfall resulted in increased DIN at Looe Key SPA above levels known to stress and cause die-off of coral reefs. Healthy coral reefs have DIN:SRP ratios of 4:1 - 7:1, and the spikes at Looe Key ranged up to 25:1 in the 1980s to over 60:1 in the 1990s.

Statistical analysis of the long-term data revealed that patterns of coral loss were driven primarily by increasing DIN, with no significant effects from temperature.

Sources of land-based DIN include inadequately treated sewage, cesspits, septic systems, fertilizers and top soil. Another significant relationship was found between chlorophyll *a* and DIN:SRP, which illustrates how the increased phytoplankton or “greening” of the Keys coastal waters is causing phosphorus starvation in reef corals, effectively reducing their temperature threshold for bleaching.

Interestingly, although the maximum temperatures at Looe Key SPA exceeded the threshold for coral bleaching in many years during the study, the three mass bleaching events in the FKNMS were in 1987, 1997/1998, and 2014/2015, periods following heavy rainfall and runoff, and spikes in the DIN:SRP ratio.

The results provided compelling evidence that nitro-

gen loading from the Florida Keys and greater Everglades ecosystem caused by humans, rather than warming temperatures, is the primary driver of coral reef decline at Looe Key SPA during the long-term study.

Concentrations of DIN at Looe Key SPA are now above the U.S. Environmental Protection Agency target concentration of ~10 ppb established for reefs in the FKNMS, which is an identical concentration to the adopted phosphorus standard for the Everglades Protection Area.

Nitrogen loading to coastal waters is predicted to increase by 19 percent globally simply as a result of increased rainfall due to climate change, which suggests that urgent need for management actions to prevent further degradation.

Following several wet years and major runoff between 2013 and 2017, stony coral tissue loss disease is currently causing rapid decline in the remaining live coral cover at Looe Key.

The good news is that something can be done about

LAPOINTE
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Environmental justice movement helps bring jobs to underserved communities

By DAVID CASAVANT

The term “environmental justice” is often defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulation and policies.

Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.

The environmental justice movement became part of our lexicon in 1982 when a hazardous waste landfill was sited in a small, predominately African-American community in Warren County, NC. The residents were concerned about the close proximity of the landfill to their schools, churches, playgrounds and homes.

The Warren County protests ultimately failed to prevent the siting of the disposal facility, however, it did give birth to the environmental justice movement, not just locally but on a national scale.

The siting of this hazardous waste disposal facility was not an isolated event.

Dr. Robert Bullard, who is universally recognized as the “father of environmental justice,” noted that “(w)hether by conscious design or institutional neglect, communities of color in urban ghettos, in rural ‘poverty pockets’ or on economically impoverished Native-American reservations face some of the worst environmental devastation in the nation.”

Simply stated, the siting of facilities where environmental contamination may occur has been disproportionately located in poorer communities and communities of color.

How do we solve this problem?

There exist several possible solutions including appropriately siting these facilities away from the public and cleaning up blighted and contaminated sites in affected communities.

In 1995, the U.S. Environmental Protection Agency launched its first Brownfields and Land Revitalization Program to promote the cleanup of blighted and possibly contaminated properties. The program provides funding to local entities for assessment, cleanup and the sustainable reuse of brownfield sites across the country.

This summer, six Florida entities received \$2.1 million in assessment grants from EPA, many of these in underserved communities. The funds will be used to conduct 94 Phase I and 38 Phase II environmental site assessments.

Grant funds also will be used to prepare 25 cleanup plans and eight reuse plans, to develop community involvement plans and to conduct community involvement activities.

EPA funding in Florida under their brownfield programs is helping to turn these blighted properties into viable space for future use and development. As a residual effect, the elimination of these blighted properties fosters community pride and encourages other reclamation projects within a community.

Another solution to environmental justice disparities is to provide training to residents of the affected communities so they can gain employment during the cleanup of

the brownfield sites in their neighborhood.

The purpose is twofold—to get local, vested residents involved in the transformation of their community and to train these workers for well-paying, sustainable employment in the environmental services field.

In 1998, EPA launched its first brownfields job training pilot project to foster this initiative. The initiative became known as the Environmental Workforce Development and Job Training, or EWDJT, program.

This outreach program furthered environmental justice by ensuring that residents living in communities historically affected by economic disinvestment, health disparities and environmental contamination including low-income, minority and tribal communities, have an opportunity to reap the benefits of revitalization and environmental cleanup.

Recipients of the EWDJT grants work to recruit, train and place local, unemployed and under-employed residents in full-time jobs in the environmental field. Traditionally, these are environmental jobs that contractors often fill with workers from outside the affected communities.

In 2018, EPA selected the city of Pahokee for two brownfield assessment grants totaling \$300,000. According to Bureau of Labor Statistics data, more than one in four people there are unemployed and nearly one in three live below the U.S. poverty line.

Also, in 2018, the Southwest Florida Regional Planning Council was awarded \$600,000 in brownfield assessment grants to service the towns of Immokalee, Clewiston and Moore Haven. These towns are historically disadvantaged—43 percent of the population in the Immokalee Brownfield Area is living below the U.S. poverty line.

Through training in sustainable jobs in the environmental services sector, residents become a part of redevelopment within their own communities, which fosters a real sense of community pride.

On a more personal level, graduates of the EWDJT program have found employment in diverse areas such as landfill operations, disposal facilities, environmental engineering firms, wastewater treatment plants, chemical plants and construction companies.

The results of the EWDJT program have been remarkable. To date, more than 13,400 residents have been trained

CASAVANT
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Florida Specifier

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The *Florida Specifier* welcomes columns, articles and letters to the editor on any subject or issue pertinent to the environmental, regulatory and technical areas the newspaper covers. We reserve the right to edit all submissions for newspaper style and publish submissions on a space-available basis only. The opinions expressed on this page are those of the authors.

Changes coming to ASTM'S Phase I environmental site assessment process

By NICHOLAS ALBERGO, PE, DEE

There are significant changes being considered by members of the ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action. The committee, first formed in 1990, is responsible for the Phase I standard among many others. Consistent with ASTM bylaws, the Phase I standard is now due for review and reapproval.

Some modifications to the standard simply address updates to the brownfields provisions of CERCLA, passed as part of the fiscal year 2018 omnibus appropriations bill. Among the relevant provisions are:

- A local or state government that takes control of a contaminated site no longer has to be an "involuntary" acquisition.
- Liability relief is now available for Alaska Native villages and Native corporations for a facility received under the Alaska Native Claims Act, as long as the entity did not cause or contribute to the release of a hazardous substance from the facility.
- The bona fide prospective purchaser definition was amended to include language related to those who have tenancy or leasehold interests in the facility.
- Publicly owned sites acquired prior to Jan. 11, 2002 can apply for assessment and remediation grants as long as the entity is not responsible for the contamination.

Some of the proposed changes involve updates such as that associated with records review. In lieu of specifically defining titles to state and federal databases, the committee is considering moving towards simply discussing "lists" of publicly available, practically reviewable and reasonably ascertainable databases.

Some of the proposed changes involve clarification of existing definitions and concepts. For example:

- Clarifying the terms "facility," associated with records reviews; "site," associated with the various task requirements of the assessment such as reconnaissance; and "property," associated with the specific subject of the assessment. Currently, these terms are often used interchangeably and create confusion.
- Clarifying "adjoining properties" to observe and note relevant features that may have abutted the property such as borrow pits, historical filling, agricultural use, rail corridors and dump sites, but are now under public thoroughfares and likely missed.
- Clarifying what makes a data gap "significant," as such have specific reporting requirements.
- Strengthening the discussion of what defines a "finding" and how "opinions" are generated.
- Revising Section 12 of the standard to address the

LAPOINTE

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the increasing DIN from land-based sources, such as more effective sewage treatment, a reduction in fertilizer inputs, and increased storage and treatment of stormwater on the Florida mainland.

The impact of local land-based DIN contributions from sewage treatment plants that service 76,000 year-round residents and an estimated 3.8 million tourists annually is currently being mitigated by completion of centralized wastewater collection and advanced wastewater treatment plants that include nutrient removal throughout the Florida Keys.

In addition, the future success of the Comprehensive Everglades Restoration Plan will rely on recognizing the hydrological and nutrient linkages between the Everglades, Florida Bay and the Florida Keys. According to the Florida Keys National Marine Sanctuary, ocean-related activities associated with coral reefs add more than \$8.5 billion each year and 70,400 jobs to the local economy in southeast Florida.

The bottom line is important. Citing climate change as the exclusive cause of coral reef demise misses the critical point that water quality plays a key role, too. While there is little that communities living near coral reefs can do to stop global warming, there is a lot they can do to reduce nitrogen runoff. The Looe Key study shows that the fight to preserve coral reefs requires local, not just global, action.

Financial support for the research was provided by the National Oceanic and Atmospheric Administration's National Marine Sanctuaries Program, Monroe County, Herbert W. Hoover Foundation, John D. and Catherine T. MacArthur Foundation, U.S. Environmental Protection Agency, National Aeronautics and Space Administration's ROSES program, the "Save Our Seas" specialty license plate funds granted through the Harbor Branch Oceanographic Institute Foundation, and the Coastal Ocean Association for Science and Technology.

Brian Lapointe, PhD, is a research professor at Florida Atlantic University's Harbor Branch Oceanographic Institute in Fort Pierce. He can be reached at blapoin1@fau.edu.

confusion created by the concept of an "opinion regarding additional investigation."

Some of the proposed changes are in response to user demands and involve strengthening the requirements that must be incorporated into the opinions regarding a finding and conclusion of a "controlled recognized condition" and an "historical recognized condition." For example:

- Should a finding and conclusion of a CREC include an environmental professional's opinion regarding whether or not the past release continues to be satisfied by the institutional or engineering control.
- Should a finding and conclusion of a HREC include an environmental professional's opinion regarding whether or not there is adequate information to confirm the adequacy of a self-directed cleanup in the context of a REC.
- Should the viability of ESAs be lengthened and, if so, what are the requisite tasks that must be performed including the fundamental concept of what the user "knows" or "should know" based on more recent site developments.

This of course will often require a level of academic training and professional experience that may not be fully covered by the existing definition of an environmental professional. In response, the committee is considering introducing the concept of "responsible charge" that codifies the responsibilities for the EP who assumes direct control and supervision of the product, even if the work was largely performed by an EP who may not have such background.

It's a good time and place for environmental consulting

By STEVE HILFIKER

It is the Season ... The question is, which season is it? With hurricane season, conference season, tourist season and legislative season, there sure is a lot going on these days. This is a good time and a great place to be an environmental consultant.

Conference season

The conference season is highlighted by the upcoming Florida Remediation Conference, Nov. 7-8, 2019, in Orlando. Take a look at the abstracts and presentations. If you are in the assessment and remediation industry, your firm is missing out if you're not represented. With new technology and innovation on display, this is a great annual event, and this year, the 25th anniversary, promises to be the best one yet.

Hurricane season

The importance of stormwater management is evident as we close out the rainy season. I'm sure all of you can think of a few parking lots and roads that flood regularly during afternoon storms.

Areas of concern were particularly evident after Hurricane Irma. Thousands of residents were trapped behind flood waters. We have work to do as practitioners in Florida to manage this comprehensive issue.

Hurricane season is a good time to be thinking about stormwater pollution prevention. The Florida Stormwater Conference is scheduled for Dec. 4-6, 2019, in Tampa.

Tourist season

Our seasonal residents are returning and ready to make real estate investments. Many tourists will decide this is the year to move here year-round.

Incentives for the redevelopment of older infrastructure should be made readily available. Smart growth and planning are critical for our grandchildren. We have a duty to make sure they are drinking clean water, and can enjoy healthy springs, rivers, lakes and beaches.

Golf courses, most of them, will be packed. But some are struggling and need high level professional guidance to help them meet regulatory criteria.

Same for farmers, some of whom plan to sell their land and retire. Some of these property owners need support. Most of the land is already cleared, and redevelopment—the remedy for issues that exist on some of these sites—should be focused on cleared land with incentives.

If not, raw land will be cleared for development and will exacerbate the environmental issues discussed in this article year-round.

Legislative season

Committee weeks for the 2020 Florida legislative session have already started. Since last year was an election year, few bills made it through the committees and even fewer made it to the floor. This year is shaping up to be a very active session.

The Florida Department of Environmental Protection's legislative budget request for the Petroleum Restoration Program is \$125 million, indicating their intent for more remediation projects now that most sites in the program have been assessed. A few bills are in planning stages and others from last year are expected for reissue.

Undoubtedly, water quality and quantity will remain on the minds of legislators during the 2020 session. Ev-

Finally, the committee is entertaining some conceptual challenges brought on by emerging contaminants such as per- and polyfluoroalkyl substances, a group of man-made chemicals that includes PFOA, PFOS, GenX and many other chemicals.

Such chemicals have been manufactured and used in a variety of industries around the globe, including in the U.S., since the 1940s. These chemicals are very persistent in the environment and in the human body, and can be found in food, commercial household products, the workplace, drinking water and living organisms.

Although CERCLA does not list such chemicals as "hazardous substances," the committee does recognize that states and other jurisdictions have differing definitions for "release" or "hazardous substances," just to name a few.

Furthermore, the importance of the CERCLA amendments that confronted the concept of "good commercial and customary practice" may come into play, as it did for petroleum products, and where the local practices demand such, for example, searching for cattle dip vats in Florida.

These are just some of the issues being addressed by the committee and, NOTHING has been finalized. Nonetheless, you can expect a new standard within the next eight months.

Nick Albergo, PE, DEE, is a senior professional engineer at GHD in Tampa, the former ASTM E50.02 Vice Chair on Environmental Assessment, Risk Management and Corrective Action, and one of the original authors of the ASTM E 1527, 1528 and E 1903 Standard Practice for Environmental Site Assessments.

er glades restoration is significantly funded. We may see a shift in focus toward water reuse, septic system conversion and sewage treatment this year.

I will be heavily involved in legislative activities again this year. If anyone has ideas or suggestions for amendments or improvements, please don't hesitate to contact me.

Holiday season

That will come soon enough. We have much to do in the meantime.

Steve Hilfiker is president of Environmental Risk Management Inc. in Fort Myers, Environmental Committee chair of the Florida Ground Water Association, and a member of Florida Brownfields and Redevelopment associations. He can be reached at steve@ermi.net or 1-888-368-6468.

Will we ever have a drinking water standard for 1,4 dioxane?

Editor:

I have a question regarding the following conclusion in the article on the 1,4 dioxane draft risk evaluation article on Page 2 (an item in our Federal File column the

August/September 2019 issue of the *Specifier*): "Since the draft assessment found no risk, there will be no risk assessment and no follow-up exposure limits proposed for drinking water." How did you come up with this conclusion? Did you find it in the 1,4 dioxane draft risk evaluation document or in the EPA assessing and managing chemicals under TSCA website? Please let me know.

Sheila Guevara, MSEnV, E.I.
Water Quality Specialist
Utilities Department
City of Sanford
Sanford, FL

Editor's note: The writer sent a similar question to the U.S. Environmental Protection Agency seeking clarification and received the following reply:

Ms. Guevara:

Cindy Wheeler in EPA's Chemical Control Division referred your water question about 1,4-dioxane to me. 1,4-dioxane is not currently regulated in drinking water but it was listed on the fourth Contaminant Candidate List.

After a contaminant is listed on the CCL, it is evaluated under the Regulatory Determination process to determine whether EPA should initiate the process to develop a national primary drinking water regulation. Under the Regulatory Determination process, EPA compiles and evaluates additional data on all of the CCL contaminants, if available, and determines which contaminants have sufficient information to be evaluated against the three criteria listed in SDWA for making a regulatory determination. Those criteria are: 1) The contaminant may

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have an adverse effect on the health of persons; 2) The contaminant is known to occur or there is substantial likelihood the contaminant will occur in public water systems with a frequency and at levels of public health concern; and 3) In the sole judgment of the administrator, regulation of the contaminant presents a meaningful opportunity for health risk reductions for persons served by public water systems.

EPA is currently in the process of evaluating the contaminants on the fourth CCL and is anticipating publishing a notice presenting the preliminary regulatory determinations and supporting rationale for those determinations.

Additional information about the CCL and Regulatory Determination processes is available at <https://www.epa.gov/ccl>.

RichWeisman
U.S. EPA OW/OGWDW
Washington, DC

Editor's note: Our reply is from Roy Laughlin.

In reply to Ms. Guevara's letter seeking clarification, I should note that my article included a sentence after the one cited: "Public health advocates expected that the (Lautenberg Act-TSCA) risk assessment would be the first step toward a drinking water standard."

My subsequent comment that we should not expect a standard is couched in source articles that expressed that sentiment, particularly one available on the Environmental Working Group's website, "Hidden Carcinogen Taints Tap Water, Consumer Products Nationwide."

Perhaps that article should have been quoted explicitly, but Federal File items rely less on quotes than on summaries.

Ms. Guevara, in her communications, advocated for a clarification that includes a statement from the EPA, a statement that was in an EPA press release when the 1,4 dioxane action was announced in July.

I believe EPA Administrator Andrew Wheeler made the same statement in his public comments at the time. I chose not to include the statement in my article because I considered it to be disingenuous for the following reasons:

1. EPA did not say which other agency programs would specifically address the

issue of 1,4 dioxane in drinking water, nor did it make any commitments to take further action.

2. The language in the EPA statement cited by Ms. Guevara, "at the sole discretion of the administrator," copies language supporting 1,4 dioxane's placement in the Safe Drinking Water Act's Candidate Contaminant List 4. I therefore assume that rule was the other program the EPA refers to.

The CCL4 list was finalized and announced in 2016. It predates the current administration. The "sole discretion of the administrator" does not in any way imply that either Scott Pruitt or Andrew Wheeler was the source of the sole discretion.

The EPA initiated reviews on four CCL4 compounds. At least one of those reviews predated Trump's inauguration, perhaps all of them. Since the CCL4 listing, the EPA has not taken any further action on 1,4 dioxane. The EPA has until 2022 to complete action on the CCL4 listed chemicals. This "denial by delay" is likely to be permanent as the timely action interval for CCL4 expires.

It is on that basis, more than any other fact or circumstance, that I doubted the prospects for any federal 1,4 dioxane standard for drinking water.

Since the *Specifier* printed the item about 1,4 dioxane, the *New York Times* and National Public Radio reported that the Trump administration in its 31 months of existence had completed the repeal of 46 environmental protection rules, and is in the process of repealing or weakening 45 others.

It is hard to think of any rule or standard the current administration has attempted to tighten in the same time span unless the rule was in its final stages under the Obama administration. The EPA administrator's discretion is clearly not focused on increasing environmental protections, regardless of lip service to the contrary.

Essentially, no other customary procedural path or usual action exists now leading to a competent quantitative EPA review to yield a potable drinking water standard for 1,4 dioxane within the lifetime of the current administration, or the lifetime of most of the people reading this note.

The EPA uses its listing processes to focus on a specific compound, make a de-


cision and then move on. When a listing "expires," the agency administratively closes the book on reviews under TSCA. The failure to initiate any reviews under the Clean Water Act before the expiration of CCL4's five-year life span is a functional denial by delay that will not lead to any standards.

Ms. Guevara and I agree on the need for a drinking water standard for 1,4 dioxane. We differ because I don't think that it is realistically probable that our readers will see a standard within their lifetimes, and certainly not within a timeframe that would protect the newest generation


from its adverse health effects.

I would like to be proven wrong about a 1,4 dioxane standard in drinking water within the next few years. The Environmental Defense Fund announced a lawsuit in late August to goad the EPA into completing reviews of chemicals on the CCL4 list. That would not necessarily guarantee a standard any more than the TSCA review, but at least the Trump administration would be on the record for a decision rather than a denial by delay.


I remain convinced that my characterization of the process is accurate.



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Denmark bans fluorinated organic compounds in food packaging

Staff report

In early September, Danish Food Minister Mogens Jensen announced a ban on all paper food contact materials containing perfluoroalkyl aliphatic substances and polyfluoroalkyl compounds, which collectively will be abbreviated here as PFAS.

This includes cardboard and packaging papers coated or containing the compounds.

The Danish Ministry took the action citing both human health effects and the chemicals' persistence in the environment. The ministry has advised against the use of PFAS papers and packaging for years.

The ban, while receiving some support from manufacturers and food packagers, was insufficient to completely end the use of PFAS papers and cardboard in Danish food packaging.

In its announcement, the ministry noted that substitute chemicals are available to make food packaging both water- and grease-resistant, and do not pose the human health and environmental risks attributed to PFAS.

The Danish ban applies to all organic fluorinated compounds in any cardboard or paper food contact materials.

Recycled paper materials treated with PFAS will be allowed to continue in use, but must be separated by a barrier that will keep PFAS from migrating into the food.

The Danish ban, effective July 2020 after review, marks Denmark as the first country to ban PFAS in this particular use.

Here in the U.S., Congresswoman Debbie Dingell (D-MI) introduced new legislation, "Keep Food Containers Safe from PFAS Act."

It authorizes the U.S. Food and Drug Administration to declare any food containers or cookware containing PFAS "unsafe." The bill is now in the hearing process.



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South Patrick Shores community approved for federal military cleanup program

By **BLANCHE HARDY, PG**

Residents of South Patrick Shores in Brevard County have voiced concerns about military waste buried in their community for close to 20 years. The community is part of the Naval Air Station Banana River off-base disposal area. NAS Banana River was renamed Patrick Air Force Base in 1950.

In late August, the U.S. Army Corps of Engineers approved the site as a Formerly Used Defense Site. The authorization includes the area within the boundary created by Ocean Boulevard, Clairbourne Avenue, Pelican Drive and Highway A1A.

The first step will be a preliminary assessment to review the site's history and the Navy's use of the land, and to evaluate if further investigations are necessary. Typically, a site inspection that confirms status of military-related impacts would follow the preliminary assessment.

Patrick Air Force Base has been active for almost a quarter of a century. Residents south of the base have found military waste, including ordnance, buried in their backyards.

In addition, the area has a local reputation as a cancer hotspot.

The Navy acquired 1,823 acres of land

between the Banana River and the Atlantic Ocean in 1939 and began constructing a seaplane base that eventually evolved into Patrick AFB.

"The team will need to visit the site and other locations that may have historical documents available," said Richy Rosado, public affairs specialist with the corps. "Once they have completed their research, they will prepare the preliminary assessment. We anticipate the report will be fi-

FEDFILE From Page 2

intends to make equipment or process changes, or to expand. Electricity generating facilities are those usually subject to NSR.

The EPA requires a preconstruction permit when a facility plans to make major modifications that increase air emissions. An NSR is a two-step review process to determine if a preconstruction permit is required.

In Step 1, a determination is made as to whether the project or modification will by itself increase air emissions significantly. If the finding is "yes," then a detailed evaluation determines whether there will be an overall increase in emis-

It considers all other emission increases

and decreases that may have occurred at the facility during the preceding several years. Those unrelated to the proposed project are included in the review.

The Step 2 calculation is referred to as "contemporaneous netting." It is often a complicated and time-consuming exercise. The new policy "clarifies that both projected emission increases and projected decreases that are attributable to a proposed project can be considered during Step 1 of the two-step NSR applicability process. This process, once called 'project netting,' is now more accurately referred to as project emissions accounting," explained the agency in its press release.

According to the release, the EPA's recent action codifies a 2018 guidance memorandum issued by then-EPA Administrator Scott Pruitt.

to the public, which will have at least 30 days to comment on it, Rosado said.

The corps previously found the site ineligible for FUDS in 1991 due to lack of written evidence the property had been used by the Navy.

However, materials recovered in 2018 revealed that the Navy did, in fact, use the property to dispose of materials from NAS Banana River making the property eligible for the federal cleanup program.

Biscayne Bay ecosystem. National Oceanic and Atmospheric Administration scientists recently published research indicating that significant declines in the areal coverage and species composition of seagrasses in Biscayne Bay is leading to an "ecological regime change."

The scientists warn that the dominant seagrasses, which includes all seven known species of seagrass, are now in water so eutrophic that phytoplankton in the water column are becoming the dominant primary producers, shading and choking out seagrasses on the bottom.

When excessive eutrophication causes ecological regime change from seagrass-dominated primary production, it is considered irreversible within human time frames.

Experience indicates that existing seagrass beds may survive in waters with elevated nutrient concentrations. Once killed off, however, seagrass beds will not reestablish until nutrient levels are much lower.

The data implicating phosphorus and nitrogen inputs comes from 48 water quality monitoring stations in operation around Biscayne Bay for the past decade.

The data indicated the highest nutrient spikes inshore and in Tuttle Bay, the enclosed north end of Biscayne Bay. This distribution points directly at nutrient sources from the watershed.

NOAA staff and scientists are actively working with cities around the bay area to promote better runoff control practices including restricted fertilizer use, maintenance to repair and replace leaky septic tanks, and more effective stormwater management.

Dade County highway status. The EPA recently sent a letter to the U.S. Army Corps of Engineers opposing construction of the Dolphin Expressway/836 Freeway, a proposed six lane toll road in West Kendall in southwestern Dade County.

The EPA cited "substantial and unacceptable adverse secondary impacts on the Greater Everglades" in the letter criticizing the permit application by the Miami-Dade Expressway Authority, MDX.

Three hundred and fifty acres of freshwater wetlands in Bird Drive Basin would suffer primary ecological direct impacts resulting from road construction.

The basin is an important recharge area for the shallow Biscayne Aquifer, a primary drinking water source for the city of Miami and the Florida Keys.

The EPA characterized the area that can be impacted by the highway as an "aquatic resource of national importance."

In its letter, the agency criticized the project application for failing to consider alternatives to reduce ecological harm; failing to show the construction complies with environmental regulation that allows wetland degradation; and failing to consider the effects of "induced development" resulting from the highway construction.

The South Florida Water Management District and the Florida Department of Environmental Protection have also asked pointed questions about the project.

In addition to the South Florida Water Management District, the U.S. Department of the Interior and the Miccosukee Tribe own much of the land in the Bird Drive Basin. The government lands have been earmarked for Everglades restoration work to restore water flow south through the Everglades.

A recent *Miami Herald* story noted that lack of political support rather than environmental lapses may doom the project.

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Calendar

October

OCT. 9 – Seminar: Wastewater Process Seminar, Fort Myers, FL. Presented by the Florida Water Environment Association. Call (407) 574-3318, email info@fwea.org or visit www.fwea.org.

OCT. 9-11 – Course: Backflow Prevention Assembly Repair and Maintenance Training and Certification, Orlando, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 9-11 – Conference: 14th Annual Regional Stormwater Conference, Chattanooga, TN. Presented by the Southeast Stormwater Association. Call (866) 367-7379 or visit www.seswa.org.

OCT. 10-11 – Course: Initial Training for Operators of Landfills and Waste Processing Facilities, Plant City, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 10-11 – Course: Asbestos Management Planner, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 13-16 – Conference: 2019 American Council of Engineering Companies Fall Conference, Chicago, IL. Call (202) 347-7474 or visit www.acec.org.

OCT. 14-18 – Course: 40-Hour OSHA HAZWOPER Training Course, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 14-16 – Course: Backflow Prevention Assembly Repair and Maintenance Training and Certification, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 14-18 – Course: Wastewater Class C Certification Review, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 16-18 – Course: 24-Hour OSHA HAZWOPER Training Course, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 17 – Course: DEP SOP's for Water Sampling & Meter Testing, Miami Beach, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 17-18 – Course: Backflow Prevention Assembly Repair and Maintenance Training and Certification, Venice, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 17-18 – Course: Backflow Prevention Recertification, Pensacola, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 19 – Course: Understanding Hazardous Waste in Solid Waste Operations, Davie, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 21-24 – Course: Backflow Prevention Assembly Tester Training and Certification, Jacksonville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570.

OCT. 21-24 – Conference: WASTECON 2019, Phoenix, AZ. Presented by the Solid Waste Association of North America. Call (800) 467-9262 or visit swana.org.

OCT. 21-25 – Course: Backflow Prevention Assembly Tester Training and Certification, Pensacola, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 21-23 – Course: Backflow Prevention Assembly Repair and Maintenance Training and Certification, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 21-25 – Course: Asbestos Contractor/Supervisor, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 23-25 – Meeting: 2019 Fall Meeting and Technical Session of the Florida Society of Environmental Analysts, Jupiter, FL. Call (941) 748-5700 or visit www.fsea.net.

OCT. 24-25 – Course: Effective Utility Leadership Practices, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 25-26 – Course: Backflow Prevention Recertification, Jacksonville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 29- NOV. 1 – Course: Water Class B Certification Review, Gainesville, FL. Presented by the

University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

November

NOV. 1-9 – Course: Backflow Prevention Assembly Tester Training and Certification, Venice, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 2-3 – Course: Backflow Prevention Recertification, Tampa, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 2-3 – Course: Backflow Prevention Recertification, Bradenton, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 4-8 – Course: Backflow Prevention Assembly Tester Training and Certification, Destin, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 4-8 – Course: Backflow Prevention Assembly Tester Training and Certification, Orlando, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 4-5 – Course: Backflow Prevention Recertification, Altamonte Springs, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 5-7 – Course: Train the Trainer: How to Design & Deliver Effective Training, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 6 – Forum: Alabama Fall Forum, Guntersville, AL. Presented by the Alabama Section of the Solid Waste Association of North America. Call (334) 260-7970 or visit www.alswana.org.

NOV. 6 – Course: Asbestos Refresher Management Planner, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 7-8 – Course: Backflow Prevention Recertification, Davie, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 7-8 – Conference: 25th Annual Florida Remediation Conference, Orlando, FL. Presented by National Technical Communications Co. Inc., publisher of the *Florida Specifier*. Call (407) 671-1111, email mreast@enviro-net.com or visit www.enviro-net.com/frc.

NOV. 7 – Course: Asbestos Refresher Contractor/Supervisor, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 11-14 – Course: Backflow Prevention Assembly Tester Training and Certification, Miami, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 12-14 – Course: Fundamentals of Slope Stability and Settlement for Solid Waste Disposal Facilities, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 12-13 – Course: Backflow Prevention Recertification, Destin, FL. Presented by the University

of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 12-14 – Summit: American Water Summit, Houston, TX. Organized by Global Water Intelligence and Global Water Leaders Group. Visit www.americanwatersummit.com.

NOV. 13-15 – Course: Initial Training Course for Landfill Operators and C&D Sites- 24 Hour, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570.

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NOV. 13 – Course: Initial Training Course for Spotters at Landfills, C&D Sites and Transfer Stations, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570.

NOV. 13-14 – Course: Refresher Training Course for Experienced Solid Waste Operators- 16 Hour, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 13 – Course: Refresher Training Course for Experienced Solid Waste Operators- 8 Hour, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570.

NOV. 13-15 – Course: Initial Training for Operators of Landfills and Waste Processing Facilities, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

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Asbestos: Project Design
Apr. 7-9, 2020 | Gainesville, FL | CEUs: 2.4

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Nov. 18-22, 2019 | Gainesville, FL

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monitoring will continue in order to evaluate the ongoing progress and document degradation rates and the contribution of elevated groundwater temperatures.



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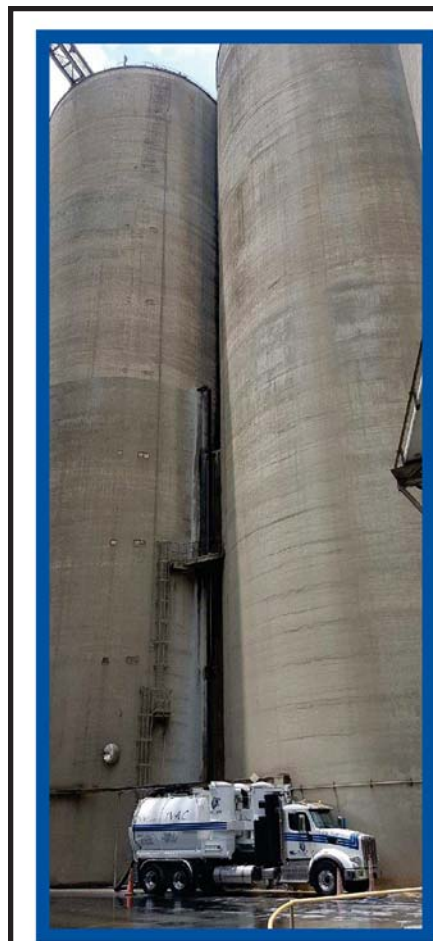
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11:00 Effective Distribution of Emulsified Vegetable Oil in the Subsurface

David Alden, PE, Technical Services Manager, Tersus Environmental Inc., Wake Forest, NC

Emulsified vegetable oil is a well-used substrate to address chlorinated solvents in aquifers that is only effective for enhanced bioremediation if it is adequately distributed through the contaminated subsurface. Understanding factors affecting emulsion stability, fate and transport in the subsurface allows the adequate design of an injection system. Many projects have failed due to design oversimplification, improper bench scale test interpretation, unexpected geochemical interactions and overall poor hydraulic design. Different well-studied consideration used in the early biostimulation era will be discussed, as well as deeper analysis of the behavior of oil droplets in an aqueous phase as a colloidal suspension, including pore-blocking mechanisms and the effects of droplet size, fluid velocity, NAPL buoyancy and other surfactant-oil-water-soil interactions. Filtration becomes a prevalent factor in the underground hydrodynamic analysis of EVO flow. Zeta potentials, the difference between bulk fluid and stationary fluid layer attached to droplet surface, allows quantifying the effectiveness of EVO flow and experimental results can be used to better predict EVO flow behavior and optimize an injection strategy.

11:15 Combined Remedy Treatment of Multi-Chemical Solvent Plume in Fine-Grained, Low Permeability Sediments

William Brab, CPG, PG, Remediation Geologist, AST Environmental Inc., Midway, KY

A former chemical plant operating at this site since 1957, stored, repackaged and distributed chemicals including but not limited to hydrogen peroxide, methylisobutyl carbinol or MIBC, tetrachloroethene, acetone, ethanol and diesel fuel. In the early 1980s, approximately 29,000 pounds of MIBC was released into the environment. Response to the release was to cover the area with black plastic and then sand. Reportedly, as a follow-up, neither free product nor soils were removed. Numerous investigations completed between 1991 and 1999 identified approximately 10 halogenated solvents present in soil vapor, groundwater and soil. Dual-phase extraction was utilized from 2000 to 2010 with limited results. Alternative remedial technology was evaluated in 2011, and the selected technologies involved a combination of ex-situ and in-situ methods to achieve the site cleanup goals in a multi-phased approach. High-density qualitative soil and groundwater sampling was conducted in 2011 and 2012 to refine the existing conceptual site model. High density soil and groundwater sampling verified vertical and horizontal distribution of contaminant mass on and off-site. Significant unsaturated mass confirmed a sustained NAPL source for potential vapor intrusion issues in adjacent residential properties and a dissolved solute plume downgradient further off-site. A phased approach utilizing combined remedies was selected as the remedial option for the facility. Interim corrective action was completed in 2013 and 2014 and included an off-site in-situ permeable reactive barrier utilizing Trap & Treat® BOS 100® to capture dissolved impacts leaving the facility, and shallow soil mixing activated persulfate to mitigate unsaturated soil impacts adjacent to source media. Full-scale Phase 1 conducted in December 2016 utilized Trap & Treat BOS 100 + ERD to mitigate saturated source mass soil and groundwater impacts. Full-scale Phase 2 completed in September 2018 included additional off-site source and dissolved-phase treatment utilizing Trap & Treat BOS 100 + ERD. The presentation will discuss the development of the CSM over time and highlight the remedial action as a site-specific case study example. Lessons learned and relevant data presented will include benefits of high-density indiscriminate (regardless of field screening/field observations) soil and groundwater sampling for qualitative analysis in the laboratory. Remedial evolution will highlight the development, selection and use of a new cutting-edge application of cometabolic synergy: granular activated carbon impregnated with metallic reactive iron coupled with an enhanced reductive chlorinating biological component. The limiting factor in most abiotic remediation technologies is the finite amount of reducing material, in this case metallic iron. Improvements to the BOS 100 platform will be specifically discussed as part of this case study and remedial technology evaluation.

11:30 The Use of MODFLOW to Design a Groundwater Extraction System for MTBE Remediation

Brandon Poiencot, PE, Project Engineer, Golder Associates, Jacksonville

Golder completed site assessment and source removal activities at a former gas station in North Florida. Historically, methyl tert-butyl ether was only detected onsite above groundwater cleanup target levels on one occurrence. Downgradient compliance wells began to report MTBE levels above GCTL shortly after source removal activities. Golder was tasked to delineate this MTBE plume. Following direct push technology groundwater sampling activity, MTBE was detected in an area to the southeast of the former gas station. MTBE was detected above GCTL in samples from the DPT sampling and existing monitoring wells in two different aquifer units: a shallow unit, approximately 30 feet below ground surface, and an intermediate unit approximately 75 feet bgs and approximately 500 feet downgradient from the former gas station. The soil types for the shallow and intermediate aquifer units are sand and limestone, respectively, and make up the typical surficial aquifer system throughout the region. Golder continued monitoring the plume on a semi-annual basis under the assumption that the plume would naturally attenuate. The plume persisted with little migration beyond the initial plume delineation. After four years of monitoring, regulators and the property owner agreed to develop a remedial action plan to address the offsite MTBE plume. Golder proposed to design and install a groundwater pump-and-treat system to remove and treat the plume. As part of the system design, Golder utilized MODFLOW to simulate the existing surficial groundwater system and predict the number of extraction wells and pumping rates for each well in order to capture the MTBE plume. The groundwater model was developed in two stages. First, a low-resolution model was created to simulate the general groundwater behavior of the entire watershed that encompassed the site. Once the regional model was calibrated, Golder moved on to the second stage of development, using the mesh refinement tool to create a finer meshed model that focused on the site and proposed extraction wells. Particle tracking via MODPATH was utilized in the fine-mesh model to display the capture of the MTBE plume. Pumping rates from each of the proposed extraction wells were optimized to achieve capture of all the particles placed along the assumed limits of the MTBE plume. The presentation will review the development, calibration and optimization of both stages of the groundwater model.

Concurrent Session 6B: Iron Amendment Treatment Technologies

10:30 One Permeable Reactive Zone, Two Years, 365 Feet and Complete Mass Flux Reduction by Biogeochemical Reductive Dechlorination

James Studer, PE, Principal Tech. Consultant, InfraSUR LLC, Albuquerque, NM

A decades-old groundwater tetrachloroethylene plume extends 1,200 feet from a back-diffusion-fed fractured bedrock zone to an off-facility surface waterway within unconsolidated sediments. The geology and hydrology are complex. Pre-remediation-detected PCE concentrations ranged from approximately 100 ug/L at the source to 10 ug/L and less at the stream intercept. The plume was

Continued on Page 21

attenuating but not necessarily shrinking. The potential is high for the weathered bedrock to naturally attenuate PCE and transformation products via abiotic reactions with reactive minerals such as magnetite. However, mineral-based abiotic transformations do not appear significant at this site and surface water/groundwater interaction appears to be more important. PCE concentrations along the stream were above the state regulatory remediation guideline and therefore remediation was deemed necessary. Various in-situ groundwater treatment technologies were evaluated at bench-scale and a micro-scale ZVI pilot test program was completed. Biogeochemical Reductive Dechlorination was selected and documented in the RODs for this plume and other plumes at the facility. Design-basis characterization including intensive biogeochemical characterization of core was completed and a phased full-scale permeable reactive zone installation was completed. In January 2017, four borings were advanced to 50 feet below grade, followed by straddle packer direct pressurized injection of aqueous solution containing fast and slow release carbon-based electron donor, sulfate, iron and pH modification. Process and performance assessment monitoring conducted over a two-year period demonstrate disruption of previously unknown concentrated PCE mass in the general source area resulting in 500 percent increase in dissolved-phase PCE. A complex series of reactions involving BiRD led to complete elimination of the PCE, with no vinyl chloride production, over 365 feet from PRZ to a critical down-gradient performance well.

10:45 Shifts in Magnetic Susceptibility and Physical Trends of Experimental ZVI PRBs Exposed to High c-VOC-Impacted Groundwater

Alexander Korff, Engineer, Product Development, Hogan Environment Solutions, Cary, NC

Most common causes of permeable reactive barrier failure are due to losses in reactivity of zero-valent iron media and hydraulic conductivity changes. Those are related to complex mineral formation on the surface of ZVI media, possibly affecting electron transfer rates and reducing overall porosity and permeability. To better understand the performance of various ZVI media, two Cleanit® media and one conventional, reground iron media were evaluated during a six-month column test. Groundwater impacted with high levels of chlorinated volatile organic carbons, tetrachloroethene and trichloroethylene as well as associated daughter products was used to simulate an in-situ PRB with ZVI. Flow-through columns were set at a rate of 0.3 mL/min to simulate one-foot-per-day groundwater velocity associated with the site. The c-VOC concentrations were measured along the length of the columns, and effluent samples were analyzed for cations and anions. The porosity of each column was estimated before and after the long-term test using a bromide tracer test. After the completion of the six-month test, columns were dismantled and the inner ZVI media were dried anaerobically for further analysis. The magnetic susceptibility of the dried media was measured and compared with fresh media as well as reference iron hydroxides. The dried PRB media also underwent acid-digestion and instrumental analyses to evaluate shifts in iron and mineral contents. Various increases in iron hydroxide and groundwater species concentrations and quantifiable changes in magnetic susceptibilities of the PRB media were observed in the ZVI over the length of the simulated PRBs.

11:00 Optimization and Performance of ZVI Amendments for In-Situ Chemical and Biological Reduction

Gary Birk, PE, Managing Partner, Tersus Environmental Inc., Wake Forest, NC

In-situ chemical reduction is an innovative environmental remediation technique used for soil and groundwater contamination that involves the placement of a reductant or reductant-generating material in the subsurface to reduce the concentrations of targeted environmental contaminants to acceptable levels. Zero-valent iron is most commonly used for remediating halogenated ethenes and ethanes, pesticides, energetic compounds and some metals/metalloids into harmless end products. The process combines both biological processes and ZVI particle-driven abiotic pathways to chemically reduce the contaminants. The incorporation of ZVI enhances remediation by enabling various chemical reduction pathways and for halogenated ethenes limits the formation of undesirable breakdown products such as cis-DCE and vinyl chloride. Sulfide-modified zero-valent iron is attracting more attention due to its ability to achieve much higher contaminant removal efficacy than unmodified ZVI due to its selectivity to pollutants over water. Without sulfidation, ZVI will generate both H₂ to promote biological processes and electrons for abiotic pathways. With sulfidation, the production of electrons for abiotic pathways will dominate the reactions. Sulfide-modified zero-valent iron forms FeS, which promotes the abiotic pathways. FeS is highly reactive with chlorinated organic compounds. Tetrachloroethene is mainly reduced by FeS to acetylene via α -elimination (dominating reaction), to trichloroethene via hydrogenolysis and to 1,1-dichloroethene via α -elimination. TCE transforms to acetylene also via α -elimination (dominating reaction) and to DCE via hydrogenolysis. The presentation will include results and lessons learned from the latest field implementations for optimizing ZVI amendments to maximize remediation effectiveness and minimize project cost.

11:15 Full-Scale Remediation of Subsurface Chromium Impacts with Multiple Media

Bob Kelley, PhD, Vice President, Hepure, Hillsborough, NJ

A full scale in-situ treatment program was implemented to remediate hexavalent chromium impacts at a former metal plating facility. Chromium impacts were present in soil and groundwater in a complex hydrogeological system that consists of multiple lithological units within the overburden and bedrock. In-situ reductant amendments were selected to convert Cr(VI) to Cr(III) to reduce contaminant toxicity and mobility. These amendments were injected into the vadose zone using direct push injection with pneumatic fracturing to deliver zero valent iron to create a long-lasting reactive barrier preventing further migration of Cr(VI) into the overburden groundwater. Ferrous sulfide was selected as the saprolite groundwater treatment amendment based on laboratory treatability studies that confirmed the effectiveness of both sulfide and ferrous iron at reducing Cr(VI). The injection monitoring showed that pH, ORP and sulfide were good indicators of CPS transport into a well. Most wells where significant reductions in chromium concentrations were observed also showed a sustained period of depressed ORP and an increase in sulfide concentrations. Total chromium concentrations have also been greatly reduced in the saprolite with a limited zone of moderate concentrations remains within the deeper bedrock.

11:45 Remediation of Lakes, Rivers and Canals for Impacted Water Quality Using an Innovative Ferrate-Based Treatment System

Thomas Waite, PhD, PE, President and Founder, Ferrate Solutions Inc., Melbourne

High valence (+4 through +7) oxo anions of iron called ferrates, FeO_x^{y-}, have been studied by chemists for over 300 years. Commercial utilization of these unusual compounds has been extremely limited, primarily because of their inherent instability. However because of the high valence iron in these compounds, they are strong oxidants and because the residual from any chemical reaction is ferric iron, the most common element on earth, they should be commercially useful especially for environmental applications. For over 40 years, tens of thousands of publications have shown ferrate's effectiveness in environmental applications. All this research with subsequent pilot demonstrations has been performed utilizing small quantities of laboratory-synthesized ferrate compounds. Despite the astounding results observed with ferrate treatment of water, wastewater, sludge and industrial wastes, inexpensive commercial sources of a ferrate compound have never been available in the marketplace. After many years of research and experimentation in full-scale pilot studies, Ferrate Solutions engineers have designed proprietary blends of inexpensive commercially available feedstock chemicals that, when reacted together under proprietary conditions, can produce a concentrated ferrate solution that is stable for weeks. This allows a workable solution of ferrate to be continuously generated nearby its point of use. Ferrate treatment of agricultural runoff in canals has shown that it can reduce both phosphorus and nitrogen via precipitation and oxidation reactions by greater than 98 percent. At the same time color, TSS, organic toxins and heavy metals are also removed. This presentation will describe results from full scale treatment of runoff water and dredge sediment water, as well as other environmental applications.

12:00 - 1:00 **Day Two Luncheon**

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Concurrent Session 7A: Innovative Remedial Approaches

1:45 The Hybrid Remedial Approach

Sean Rome, Operations Manager, TRC Solutions, St. Augustine

A growing number of complex, large scale site remediation projects are becoming increasingly difficult to complete. Site complexities such as geotechnical challenges, groundwater chemistry, water treatment and often unnecessary involvement from external stakeholders has created a challenging environment to

Continued on Page 22

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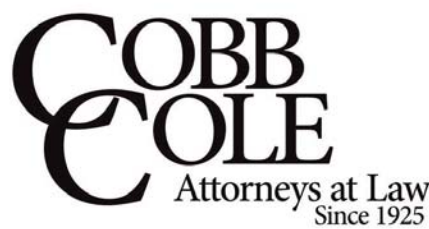
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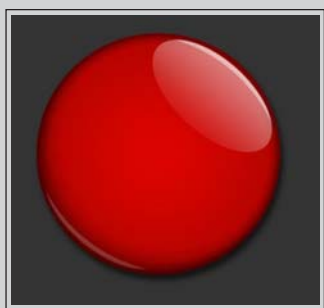
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achieve cleanup. The Hybrid Remedial Approach is a remedial technology flow process designed to address these complexities for safe and efficient site closure. Attendees of this presentation will gain insight into what HRA is and when and how to employ it, learn what HRA technologies are available and learn how to drive the HRA selection process. In addition, a case history using HRA on a coal combustion residuals remediation site will be presented.

2:00 Post-Hurricane Maria and Remediation Efforts to Address Chlorination/Non-Chlorinated VOCs and 1,4 Dioxane Impacts at Puerto Rico Facility

Brad Pekas, PG, PE, Senior Engineer and Team Leader, Trihydro Corp., Tampa

This presentation provides an update to the ongoing remedial investigation of chlorinated and nonchlorinated volatile organic compounds including 1,4 dioxane at an industrial facility in Puerto Rico. These technical discussions start where we left off in late 2017 following Hurricane Maria (an FRC 2017 presentation). This presentation includes: (1) a review of post-hurricane site cleanup actions; (2) a discussion of the operation, performance and modification of the ozone/in-situ chemical oxidation pilot study system to address the off-site 1,4-dioxane plume; (3) a review of bench-scale testing of potential direct versus cometabolism for 1,4 dioxane, and (4) a preliminary technology screening for the plant site/source area remedies. In 2017, Hurricane Maria not only damaged the above-grade, ozone pilot remediation system but also impacted several features of the monitoring network that were located, inspected, and repaired or replaced. The ozone remediation system was also modified and expanded to prevent the preferential offsite migration of 1,4 dioxane within a paleo-stream channel. A combination of in-situ and ex-situ remediation alternatives were screened for the plant site and source areas of chlorinated, non-chlorinated VOCs and 1,4-dioxane including in-situ chemical oxidation using permanganate, persulfate or both; in-situ bioremediation under anaerobic or aerobic conditions; and various ex-situ technologies such as soil vapor extraction, air sparging and dual-phase extraction. The bench-scale testing results for aerobic bioaugmentation or cometabolic degradation of 1,4-dioxane provided favorable results. The site-specific challenges encountered, site observations and data evaluation, and the final remedies proposed for this site will be addressed in this talk.

2:20 A Simplified Approach to Closure of Legacy C&D Areas at Power Industry Facilities – RBCA, Solid Waste Rules and the Old Dump Guidance

Ryan Tuttle, PG, Project Geologist, Geosyntec Consultants Inc., Tampa

Legacy construction and demolition debris areas at power generating facilities are unique as these sites can fall under either RBCA or solid waste rules after assessment completion following the Guidance for Disturbance and Use of Closed Landfills or Waste Disposal Areas in Florida. The Crystal River Energy Complex and Anclote Power Plant operated by Duke Energy had legacy C&D areas of interest to the regulatory community, with contaminants that could be related to either waste, buried waste, or natural and anthropogenic background. These case studies will describe the use of historical forensics to define time lines for disposal activities and to identify rules that were in place during the C&D area operational timeframe. Developing a defensible argument for the use of alternate cleanup target levels while also eliminating contaminants of concern due to background conditions enabled closure of the sites without entering the Ch. 62-780, F.A.C., rule process.

2:40 Mitigation of Vapor Intrusion Preferential Pathways for a Challenging Industrial Building

Joseph Corsello, PE, Project Manager, Sanborn, Head & Associates Inc., Boston MA

Assessment and mitigation of a large, old industrial building impacted by vapor intrusion of volatile organic compounds presented an unusual challenge. A building addition constructed over an existing VOC plume created hidden and unusual preferential pathways that contributed to elevated levels of VOCs in indoor air. An initial sub-slab vapor assessment revealed the presence of VOCs in the vadose zone soil gas beneath the building. As a preemptive mitigation measure, a sub-slab depressurization system was designed and constructed to control cross-building slab pressure gradients and mitigate the VI pathway. Following construction of the SSD system, startup indoor air monitoring was conducted with a field-portable gas chromatograph to obtain real-time continuous and discrete sample data. Using the GC, several VI preferential pathways created from the construction of the building addition were identified as major contributors of VOCs to indoor air. These pathways, including an old subsurface sewer pipe, several abandoned downspouts from the original building and the interstitial space within a cinder block wall and between the existing building and the addition, were not influenced by the SSD system and required additional mitigation measures. These mitigation methods, including installation of new sewer drain covers, downspout seals and a vacuum pipe to depressurize the block wall interstitial space, were implemented. Following an iterative process of mitigating the preferential pathways and then re-screening indoor air for VOCs with the field-portable GC, indoor air quality eventually improved and indoor air samples were collected, the results of which indicated achievement of indoor air guidelines.

Break: 3:00 - 3:15

Concurrent Session 7B: In-Situ Oxidation Tools and Technologies

1:45 Combined ISCO and Stabilization/Solidification for Full-Scale Remediation of a Coal Tar Source Area

Jeff Roberts, MSc, Operations Manager, SIREM, Guelph, Ontario, Canada

In-situ stabilization/solidification involves mixing contaminated soils with binders such as Portland cement, thereby decreasing the mobility and toxicity of contaminants. While ISS has a demonstrated track record at hundreds of sites, it does not typically destroy contaminants. ISS in combination with in-situ chemical oxidation, or ISCO-ISS, is an attractive option offering the possibility of contaminant destruction as well as stabilization of untreated residuals. This approach was tested for application at a former gas works site in Denmark where a full-scale ISCO-ISS remedy was implemented to destroy coal tar contamination, including benzene in groundwater, and to reduce hydraulic conductivity and improve soil strength. A rigorous pre-design bench-scale test was conducted to measure the performance of ISCO-ISS in samples collected from the site, including the impact on BTEX, sVOCs and phenolic compounds. The bench tests determined optimum dosages of ISCO-ISS amendments, the potential for using Portland cement as an alkaline activator for persulfate, reductions in leaching of coal tar contaminants, reductions in hydraulic conductivity and increases in unconfined compressive strength of the stabilized material. Specific technical challenges included managing interferences of persulfate chemistry with cement chemistry and determining the optimal application sequence of amendments. Based on the success of the bench-scale test, the ISCO-ISS remedy proceeded to pilot test and full-scale implementation in 2018. Results to date indicate that ISCO-ISS, using Portland cement base-activated persulfate, was a successful and cost-effective technology for treating the coal tar source area. The information gained from the bench-scale laboratory study was critical to the successful design of the pilot study and ultimately the full-scale implementation. Building on this successful project, guidance and recommendations for applicability of ISCO-ISS to other sites, lessons learned and refinements for implementation in future projects will be shared.

2:10 Treating 1,4 Dioxane with Activated Potassium Persulfate

Brant Smith, PE, PhD, Technical Applications Manager, ISCO, PeroxyChem, Philadelphia, PA

1,4 dioxane has emerged as a contaminant of concern at numerous sites. It is most commonly found at sites co-mingled with the chlorinated solvents it was used to stabilize, along with their daughter products. The co-mingling of 1,4-dioxane with chlorinated solvents can make treatment of the entire contaminated site more complex as 1,4-dioxane is typically treated using an oxidative radical pathway and several of the chlorinated solvents are best treated with a reductive pathway. In several instances, this has led to sites where the chlorinated solvents were treated only to expose the untreated 1,4-dioxane. Alkaline-activated potassium persulfate was evaluated at two separate sites contaminated with a mixture of 1,4-dioxane, chlorinated ethenes and chlorinated ethanes. The sites were first evaluated in a series of column

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Registration and Hotel Information

FRC Conference set for Nov. 7-8, 2019

For general questions about participating in the 25th Annual Florida Remediation Conference, call (407) 671-7777 or e-mail mreast@enviro-net.com. Visit our website at www.enviro-net.com for FRC updates, the technical session agenda, a current list of exhibitors and booth availability, speaker updates and more details.

Continuing Education Credits: PEs, PGs and LEPs

National Technical Communications Co. Inc., producer of the Florida Remediation Conference, is an approved Continuing Education Provider (CEP 0004002) for the Florida Board of Professional Engineers. As a CEP, we offer continuing education (CE) hours for attending FRC 2019 to professional engineers licensed in Florida (and other states) as follows: Attend both days, earn 12 CEs; attend Day One only and earn 6 CEs; Day Two, 6 CEs. Sign-in is mandatory for PEs and your PE license number is required. Continuing education credits are also available for professional geologists in South Carolina, North Carolina, Alabama and other states where continuing education is required for PG licenses.

In addition, FRC has qualified for continuing education credits through INSTEP, the International Society of Technical and Environmental Professionals Inc. Credits apply to those currently registered in this association. Participants will receive one CE credit for every actual hour of instruction. LEPs may enter their credits on the LEP Center Section of the INSTEP website.

Hotel Information

The Omni Orlando Resort at ChampionsGate is the host hotel for FRC 2019. The conference will be conducted in the Osceola County Conference Center at the Omni. The hotel and conference center are located just west of Orlando off I-4, exit 58. For directions and additional information about the hotel, visit their website at <https://www.omnihotels.com/hotels/orlando-championsgate>.

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reactors where site groundwater was run through the columns until the potassium persulfate had been consumed. One of the sites subsequently had a successful field pilot test with alkaline-activated potassium persulfate applied with a full-scale application in 2018. The data indicate hydrated lime-induced alkaline-activated potassium persulfate reduced 1,4-dioxane, chlorinated ethenes and the chlorinated ethanes concentrations to below detection limits. Field data not only evaluated treatment effectiveness but also the persistence of potassium persulfate compared to the site's groundwater velocity. Field data indicated that the potassium persulfate was persisting as expected based on the observed groundwater velocities, and that 1,4-dioxane was treated to below the detection limit at the PRB and significantly reduced down gradient.

2:35 ISCO Generator for Continuous Production of Reactive Oxygen Species to Remediate Soil and Groundwater – Ideal for PRB Applications

Jim Mueller, PhD, President, Provectus Environmental Products Inc., Freeport, IL

New technologies are desired for safe, cost-effective remediation of soil and water impacted by a wide variety of organic contaminants including rapidly emerging contaminants. Ideally, an in-situ technology can be effectively employed in deep aquifers and mixed lithologies to easily manage large, dilute plumes often found in remote areas. Other benefits include low cost, small footprint, minimal energy consumption, low maintenance and no external chemical requirements. One such method involves integrated electro-chemical reactions under controlled conditions. Direct oxidation at semiconductor films coupled with enhanced electro-Fenton oxidation is achieved electro-chemically and controlled remotely. Secondary effects include enhanced contaminant desorption and stimulated biogeochemical destruction. Rapid oxidation of chlorinated solvents and petroleum hydrocarbons has been observed at pilot and full scales, and future applications could address perchlorate, perfluorinated compounds, 1,4-dioxane, pharmaceuticals and other challenging contaminants. The EBR® system is comprised of subsurface electrodes with high catalytic activity for O₂ generation that is constantly reduced to form H₂O₂. An additional electrode is used as a constant source of Fe cations via forced corrosion and effective Fe²⁺ formation from Fe³⁺. The system radius of influence is self-propagating and increased by imposing an effective constant flux across the well interface due to boundary conditions effects and high chemical potential, in addition to the existing natural dispersion and advection forces. Furthermore, electro-osmosis induces groundwater flow between coupled wellbores yielding a more complete approach to aquifer remediation, especially in fine-grained, low-permeability materials that typically harbor sorbed residuals because electro-kinetics enhances the mobilization and therefore the availability of the contaminants. In terms of secondary processes to help manage contaminant rebound, the co-mobilization of nutrients and the oxidative nature of the method supports accelerated aerobic bioremediation. Successful implementation of the EBR technology at several sites has resulted in rapid site closure. The method was inspected by the Water Authority of Israel and its use is widely approved. For example, one study conducted by the Israeli Geological Survey and the Israeli Water Authority found that the electrolysis system induced rapid change in the biochemical conditions on the site. Anaerobic wells rapidly turned aerobic. As a result, from this change, a significant decrease in the concentrations of MTBE from 68 mg/L to less than 0.04 mg/L was associated with a change in its isotopic composition. Assuming that the isotopic enrichment constant in the process of groundwater MTBE breakdown equals the enrichment, constant obtained from microbial experiments in the laboratory, then more than 96 percent of the MTBE underwent oxidative destruction. Similar results from various full-scale remediation projects will be presented along with information on cost and processing. Lastly, we will present the idea of non-uniform electro-kinetics via a polarity exchange technique to intermittently reverse electric currents to prevent significant pH changes and discuss potential applications for other contaminants under various site conditions.

Break: 3:00 - 3:15

Session 8: Annual Regulatory Session

3:15 Moderator: Joe Applegate, PG, Senior Principal Hydrogeologist
Geosyntec Consultants Inc., Tallahassee

Speakers:

Natasha Lampkin, FCCM, FCCN, Program Administrator
Petroleum Restoration Program, Division of Waste Management
Florida Department of Environmental Protection, Tallahassee

Wilbur Mayorga, PE, Division Chief
Environmental Monitoring and Restoration Division, Miami-Dade County, Miami

Graham Witt, Team Leader
PRP Contract Management Team 5 (Northstar), Tallahassee

John Wright, PE, Chief Engineer
Petroleum Restoration Program, Division of Waste Management
Florida Department of Environmental Protection, Tallahassee

5:00 FRC 2019 Conference adjourns

Hotel Reservations

To make your room reservations, visit our hotel reservations link at www.enviro-net.com under "Room Reservations at the Omni Orlando Resort." If you prefer to make arrangements by phone, call 1-800-843-6664 and ask to book as part of the Florida Remediation Conference room block. Our discounted room rate of \$155 is only available until Monday, Oct. 14, 2019. There is no guarantee of room availability after this date.

Registration

Registration for the full 2019 Florida Remediation Conference is \$425. Day One Only is \$325 and Day Two Only is \$275. The fee includes registration for the conference, conference manual and flash drive containing PDF files of all the talks, continental breakfasts, beverage breaks, luncheons and the conference reception for Day One registrants. To register for the 2019 FRC conference, select registration type (full conference or one day only), and provide your complete contact information and credit card specifics. We will confirm your registration with an e-mail once it has been processed. You can also register online.

We encourage you to register early. Conference registration is limited to avoid overcrowding. Please note: Payment in full is required to confirm your registration. Cancellations received before Oct. 8, 2019, will be refunded, less a \$75 service charge. No refunds will be made for cancellations received after that date. However, paid no-shows will receive a copy of the presentation materials upon request. Substitute attendees will be accepted at any time, preferably with advance notice.

10th Annual Charity Golf Tournament

Our 10th Annual FRC Charity Golf Tournament is set for the day before FRC, Wednesday, Nov. 6th at 12:00 noon. All proceeds will go to our 2019 charity, The Gift of Swimming, a non-profit organization dedicated to children's drowning prevention in Central Florida. Information on the tourney and 2019 charity is available at www.enviro-net.com.



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CLIMATE

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partnership extremely relevant,” said Sarah Owen, president and CEO of the Southwest Florida Community Foundation. “The survey results illustrated that the changing climate knows no boundaries and impacts all who live, work and play in the region. Building personal connection to and collec-

tive leadership around the issue will empower action and sustain our quality of life.”

Leaders from each organization recently met to determine the primary goals of the initiative. They hope to empower the community members and leaders to initiate change.

The coalition will provide the information required to assist these leaders from

the health, faith, education and business community in making informed decisions for the health, well-being and sustainability of the region.

The coalition partners will build awareness and understanding of the importance of withstanding the impacts of a changing climate including hazards such as sea level rise, more frequent extreme weather events and flooding. It hopes that by understanding the root causes of the changing climate, participants will support problem-solving initiatives and adapt to become more resilient to future impacts.

“Southwest Florida has experienced multiple impacts from our changing climate, including more intense hurricanes,

flooding and worsening water quality problems,” said Rob Moher, president and CEO of the CSF. “We are committed to bringing our organization’s 55-year history of working with the community to find common-sense, science-based solutions to address the emerging issues related to our changing climate.”

The group will assist community leaders in protecting natural resources through educational outreach. Understanding the natural environment will help the community connect the impacts of changing climate to Southwest Florida’s ecosystems, including understanding the need to protect and nourish the mangroves, wetlands and dunes that protect the shoreline.

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For more information, see the Licensed Engineer (Cleanup) job posting at: <https://www.governmentjobs.com/careers/broward>.

Executive Director Lake County Water Authority

The Lake County Water Authority, (LCWA), an independent special taxing district, located in Tavares, Lake County, Florida, is accepting applications for the position of Executive Director. The position requires a Master’s degree from an accredited college or university in Public Administration, Business Administration, Management or related field; and experience in areas of natural resource planning & management, engineering, computer science, geographic information systems, contract administration, financial, administrative applications, public speaking; or any equivalent combination of related education, training and experience that provides the required knowledge, skills and abilities to perform the essential job junctions. Technical project management and personnel management experience required.

A full position description is available at: www.lcwa.org

Submit resume or curriculum vitae (CV), and a completed LCWA application online to: HR@LCWA.org or to the offices of the Lake County Water Authority, 27351 SR 19., Tavares, FL 32778.

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and more than 9,600 graduates have been placed in full-time employment with average starting hourly wage of \$14.02. This equates to a cumulative 72 percent placement rate for the program since its creation in 1998.

These numbers are encouraging, but is there a real need for workers in the environmental services sector?

According to data from the Florida Department of Economic Opportunity, employment projection data in Florida covering 2018-2026 for waste management and remediation services shows a projected 2,301 new jobs by 2026, a 9.8 percent increase, and places the waste management and remediation services industry within the top third of jobs with the greatest growth in Florida.

As the EWDJT program evolves, we see many areas to build upon and improve. One area of concern when working with

underserved communities is the issue of workplace safety.

Traditionally, construction—including demolition and remediation activities—has one of the highest injury rates in the country.

The environmental justice movement is creating jobs for underserved populations, but minority populations are still among the most-often injured at work.

According to the Occupational Safety and Health Administration, overall workplace fatalities have dropped 20 percent in the last decade, while workplace fatalities among Hispanic workers, especially those working in the construction industry, have risen almost 35 percent in the same period.

This is a trend we’d like to see reversed. After all, how can we promote environmental justice when we disregard the safety of our workers on these environmental projects?

David Casavant is the executive director of The Sustainable Workplace Alliance in Lake Wales, FL. He can be reached at david@sustainablewp.org.

NOTES

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jects including facility planning of water supply and wastewater systems, design of advanced wastewater treatment facilities, and using advanced computerized simulator models for nutrient removal.

Company notes. Orlando-based FECC Inc. closed business in September. A-C-T Environmental & Infrastructure Inc. purchased many of the company’s assets and will employ some of FECC’s former employees, mostly in field services roles, according to Rob Kincart, A-C-T president.

Zellwood-based Anuvia Plant Nutrients entered into a long-term agreement with The Mosaic Company to use part of Mosaic’s shuttered Plant City phosphate production facility and repurpose existing infrastructure to increase the production capacity for its biobased plant nutrients to 1.2 million tons.

Currently, Anuvia’s Zellwood facility produces 80,000 tons annually.

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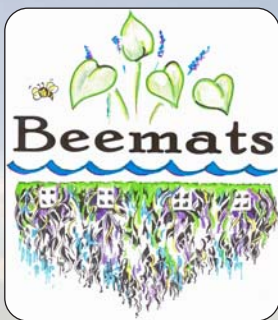


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